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For related information see also *Astronautics*.

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Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **N.A.**

89 ASTRONOMY **1116**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **1117**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **1118**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **1118**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **1119**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **1119**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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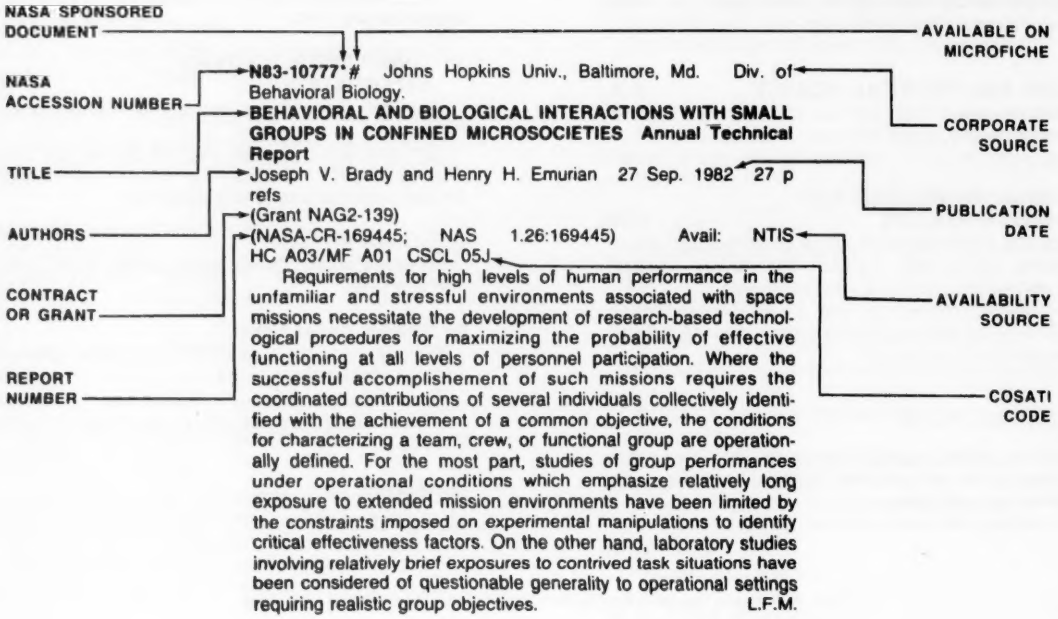
TYPICAL CITATION AND ABSTRACT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N83-10777* # Johns Hopkins Univ., Baltimore, Md. Div. of Behavioral Biology.
CORPORATE SOURCE
TITLE
BEHAVIORAL AND BIOLOGICAL INTERACTIONS WITH SMALL GROUPS IN CONFINED MICROSOCIETIES Annual Technical Report
AUTHORS
Joseph V. Brady and Henry H. Emurian 27 Sep. 1982 27 p refs
PUBLICATION DATE
CONTRACT OR GRANT
(Grant NAG2-139)
REPORT NUMBER
(NASA-CR-169445; NAS 1.26:169445) Avail: NTIS
AVAILABILITY SOURCE
HC A03/MF A01 CSCL 05J
COSATI CODE
Requirements for high levels of human performance in the unfamiliar and stressful environments associated with space missions necessitate the development of research-based technological procedures for maximizing the probability of effective functioning at all levels of personnel participation. Where the successful accomplishement of such missions requires the coordinated contributions of several individuals collectively identified with the achievement of a common objective, the conditions for characterizing a team, crew, or functional group are operationally defined. For the most part, studies of group performances under operational conditions which emphasize relatively long exposure to extended mission environments have been limited by the constraints imposed on experimental manipulations to identify critical effectiveness factors. On the other hand, laboratory studies involving relatively brief exposures to contrived task situations have been considered of questionable generality to operational settings requiring realistic group objectives. L.F.M.

VOLUME 21 NUMBER 7/APRIL 8, 1983

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N83-16275* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 153, OCTOBER 1982
Oct. 1982 154 p
(NASA-SP-7037(153); NAS 1.21:7037(153)) Avail: NTIS HC $5.00 CSCL 01A

This bibliography lists 535 reports, articles and other documents introduced into the NASA Scientific and Technical Information System in September 1982. Author

N83-16276* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 155, DECEMBER 1982
Dec. 1982 81 p
(NASA-SP-7037(155); NAS 1.21:7037(155)) Avail: NTIS HC $5.00 CSCL 01A

This bibliography lists 272 reports, articles and other documents introduced into the NASA scientific and technical information system in November 1982. Author

N83-16277* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 154
Nov. 1982 143 p
(NASA-SP-7037(154); NAS 1.21:7037(154)) Avail: NTIS HC A07 CSCL 01A

This bibliography lists 511 reports, articles and other documents introduced into the NASA scientific and technical information system in October 1982. Author

N83-16278# Aero Research Associates, Great Neck, N.Y.
AERO REPORTS AVIATION PRODUCTION FORECASTS, VOLUME 12, NO. 4 Quarterly Report
Oct. 1982 47 p
Avail: NTIS HC A03/MF A01

Product forecasts for both military and civil aircraft throughout the world (except for Soviet-block nations are compiled. A five year over view of both the American and international aircraft industries are provided. Aircraft are listed by generic type (bombers, fighters, transports, etc.) and then alphabetically by manufacturer and manufacturer's model number and/or model name. In foreign listings, the country of origin is included after the listing in parentheses. Major aircraft modification programs are listed when the modifications are extensive enough to warrant change of the model designation of the aircraft. S.L.

N83-16279*# Toledo Univ., Ohio.
SENSOR FAILURE AND MULTIVARIABLE CONTROL FOR AIRBREATHING PROPULSION SYSTEMS Ph.D. Thesis - Dec. 1979 Final Report
Khosrow Behbehani Mar. 1980 244 p refs
(Grant NsG-3084)
(NASA-CR-159791; NAS 1.26:159791) Avail: NTIS HC A11/MF A01 CSCL 01B

A new sensor/actuator failure analysis technique for turbofan jet engines was developed. Three phases of failure analysis, namely detection, isolation, and accommodation are considered. Failure detection and isolation techniques are developed by utilizing the concept of Generalized Likelihood Ratio (GLR) tests. These techniques are applicable to both time varying and time invariant systems. Three GLR detectors are developed for: (1) hard-over sensor failure; (2) hard-over actuator failure; and (3) brief disturbances in the actuators. The probability distribution of the GLR detectors and the detectability of sensor/actuator failures are established. Failure type is determined by the maximum of the GLR detectors. Failure accommodation is accomplished by extending the Multivariable Nyquest Array (MNA) control design techniques to nonsquare system designs. The performance and effectiveness of the failure analysis technique are studied by applying the technique to a turbofan jet engine, namely the Quiet Clean Short Haul Experimental Engine (QCSEE). Single and multiple sensor/actuator failures in the QCSEE are simulated and analyzed and the effects of model degradation are studied. Author

N83-16280# Tuskegee Inst., Ala. School of Engineering.
THREE COMPUTER BASED AIDS TO MAINTENANCE SCHEDULING Final Report, 30 Jun. 1981 - 23 Mar. 1982
Andrew Hargrove 13 Sep. 1982 26 p refs
(Grant AF-AFOSR-0168-81; AF Proj. 2304)
(AD-A120351; AFOSR-82-0874TR) Avail: NTIS HC A03/MF A01 CSCL 15/5

The complexity of the scheduling problem is examined including the large numbers of aircraft, the recurring changes of maintenance rules, and the conflict between a desired smooth flow of aircraft into maintenance and the desired flight procedures. Survey of typical schedulers reveals a need to allow a simple operation of a very complex system. Survey of available models reveals Decision Oriented Scheduling System (DOSS) as the most appropriate computer aid. Analysis of DOSS verifies its versatility but reveals the need to simplify it to the level of the average Air Force scheduler's expertise, to further adjust programming statements to a more natural English-like language and to allow for easier and faster programming adjustments due to unscheduled maintenance changes. GRA

N83-16281# Air Force Human Resources Lab., Brooks AFB, Tex. Logistics Research Branch.
COMPUTER BASED MAINTENANCE AIDS SYSTEM: PRELIMINARY DEVELOPMENT AND EVALUATION OF A PROTOTYPE Final Report
Donald L. Thomas Sep. 1982 21 p refs
(AF Proj. 2362)
(AD-A120627; AFHRL-TP-82-24) Avail: NTIS HC A02/MF A01 CSCL 05/9

This technical paper describes work on a project to develop and evaluate a prototype computer based system for storing, retrieving, and presenting technical data for use by maintenance personnel. The work was accomplished under three contracts. Under the first two contracts, the feasibility of developing a computer based system was established and the basic concepts and requirements for the system were developed. Two areas of concern in the development of the system were identified: (1) The need to have the technical data match the skills of the technician and (2) the need to fill the gaps in the individual's knowledge and skills. The problem of making the technical data match the skills of the technician was addressed with the concept of multiple tracks of information. Under this concept, the technical data are developed at three levels of detail for use by highly experienced and novice personnel. The problem of filling the gaps was addressed by the pool concept. Under this concept, the technicians are provided with pools of information which they can call up (e.g., instructions on how to set up test equipment). Under the third contract, preliminary work was accomplished on developing the man/machine interface, presentation formats and system design. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N83-16282*# National Aeronautics and Space Administration, Washington, D. C.
DRAG MEASUREMENTS IN TUBULAR STRUCTURE ELEMENTS. PART 3: EFFECT OF DIAMETER AND SURFACE STRUCTURE ON THE DRAG OF CYLINDRICAL TUBES
G. Schulz and F. Hayn Jul. 1982 38 p refs Transl. into ENGLISH of "Widerstandsmessungen an Systemteilen von Rohrkonstruktionen. Teil 3: Einfluss des Durchmessers und der Oberflaechenstruktur auf den Widerstand von Zylindrischen Roehren" rept. DVL-1-NK-I-68-34 Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Apr. 1968 p 1-37 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76937; NAS 1.15:76937; DVL-1-NK-1-68-34) Avail: NTIS HC A03/MF A01 CSCL 01A

Measurements on five cylinders with different surfaces show that the supercritical drag coefficient tends to 0.5 for smooth cylinders with maximum critical Re number 4.16 times 10 to the -5 power and to 0.6 for point pattern surfaces with Re number reduced to 2.16 times 10 to the -5 power. For the other surfaces, with increasing roughness the critical Re number decrease while both minimum supercritical drag coefficients increase. Author

N83-16283*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF MODIFICATIONS OF AERODYNAMIC CHARACTERISTICS OF A SINGLE-STAGE-TO-ORBIT VEHICLE AT MACH 5.9
Peter T. Bernot Jan. 1983 33 p refs
(NASA-TM-84565; L-15504; NAS 1.15:84565) Avail: NTIS HC A03/MF A01 CSCL 01A

Hypersonic stability, control, and performance characteristics were determined on a single-stage-to-orbit vehicle based on control-configured stability concepts. The configuration (0.006-scale model) had a large body with a small 50 deg swept wing. Two vertical-fin arrangements were investigated which consisted of a large center-line vertical tail and small wing-tip fins. The wing-tip fins had movable surfaces called controllers which could be deflected outward. Longitudinal and lateral directional characteristics were obtained over an angle-of-attack rage from 0 deg to 40 deg. The effects of tip-fin controller deflection on roll- and yaw-control characteristics at a sideslip angle of 0 deg were obtained. This investigation was conducted in the Langley 20 Inch Mach 6 Tunnel. Author

N83-16284*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
SUBSONIC STEADY AND UNSTEADY AERODYNAMIC LOADS ON MISSILES AND AIRCRAFT Final Progress Report
18 Jan. 1983 8 p
(Grant NsG-1262)
(NASA-CR-169749; NAS 1.26:169749) Avail: NTIS HC A02/MF A01 CSCL 01A

Steady lifting flows over highly swept delta wings at large incidence were studied. After an exhaustive literature review, development of a vortex-lattice method was attempted. To demonstrate the feasibility of using such a method, an existing code was modified. A system of vortex lines to simulate the leading-edge wake was added. The coefficients predicted by the modified code were in good agreement with experimental data. Author

N83-16285*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Applied Mechanics.
ENVIRONMENTAL SOLID PARTICLE EFFECTS ON COMPRESSOR CASCADE PERFORMANCE
W. Tabakoff and C. Balan Oct. 1982 65 p refs
(Grant NsG-3218)
(NASA-CR-168018; NAS 1.26:168018) Avail: NTIS HC A04/MF A01 CSCL 01A

The effect of suspended solid particles on the performance of the compressor cascade was investigated experimentally in a specially built cascade tunnel, using quartz sand particles. The cascades were made of NACA 65(10)10 airfoils. Three cascades were tested, one accelerating cascade and two diffusing cascades. The theoretical analysis assumes inviscid and incompressible two dimensional flow. The momentum exchange between the fluid and the particle is accounted for by the interphase force terms in the fluid momentum equation. The modified fluid phase momentum equations and the continuity equation are reduced to the conventional stream function vorticity formulation. The method treats the fluid phase in the Eulerian system and the particle phase in Lagrangian system. The experimental results indicate a small increase in the blade surface static pressures, while the theoretical results indicate a small decrease. The theoretical analysis, also predicts the loss in total pressure associated with the particulate flow through the cascade. A.R.H.

N83-16286*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Applied Mechanics.
COMPRESSOR CASCADE PERFORMANCE DETERIORATION CAUSED BY SAND INGESTION
W. Tabakoff and C. Balan Nov. 1982 71 p refs
(Grant NsG-3218)
(NASA-CR-168067; NAS 1.26:168067) Avail: NTIS HC A04/MF A01 CSCL 01A

Airfoil cascade erosion and performance deterioration was investigated in a gas particle cascade tunnel. The cascade blades were made of 2024 aluminum alloy and the solid particles used were quartz sand. The results of the experimental measurements are presented to show the change in the blade surface erosion, pressure distribution and the total loss coefficient with erosion. The surface quality of the blades exposed to particulate flows are changing the material surfaces. With time, the surface roughness increases and leads to a decrease in engine performance. It was found that the surface roughness values increase asymptotically to a maximum value with increased erosion. The experimental results indicate that the roughness parameters correlate well against the mass of particles impacting unit area of the surface. Such a correlation is useful in aerodynamics and performance computations in turbomachinery. Author

N83-16287*# Wichita State Univ., Kans.
WIND TUNNEL FORCE AND PRESSURE TESTS
W. H. Wentz, Jr. Jun. 1981 114 p refs

(Grant NsG-1165)
(NASA-CR-3439; NAS 1.26:3439; WSU-AR-78-4) Avail: NTIS HC A06/MF A01 CSCL 01A

Force and surface pressure distributions were measured for a 13% medium speed (NASA MS(1)-0313) airfoil fitted with 20% aileron, 25% slotted flap and 10% slot lip spoiler. All tests were conducted in the Walter Beech Memorial Wind Tunnel at a Reynolds number of 2.2 million and a Mach number of 0.13. Results include lift, drag, pitching moments, control surface normal force and hinge moments, and surface pressure distributions. The basic airfoil exhibits low speed characteristics similar to the GA(W)-2 airfoil. Incremental aileron and spoiler performance are quite comparable to that obtained on the GA(W)-2 airfoil. Slotted flap performance on this section is reduced compared to the GA(W)-2, resulting in a highest c sub l max of 3.00 compared to 3.35 for the GA(W)-2. M.G.

N83-16288*# North Carolina State Univ., Raleigh.
A STUDY OF OPTIMUM COWL SHAPES AND FLOW PORT LOCATIONS FOR MINIMUM DRAG WITH EFFECTIVE ENGINE COOLING, VOLUME 1
Stan R. Fox and Frederick O. Smetana Nov. 1980 119 p refs (Grant NsG-1584)
(NASA-CR-159379; NAS 1.26:159379) Avail: NTIS HC A06/MF A01 CSCL 01A

The contributions to the cruise drag of light aircraft arising from the shape of the engine cowl and the forward fuselage area and also that resulting from the cooling air mass flow through intake and exhaust sites on the nacelle were analyzed. The methods employed for the calculation of the potential flow about an arbitrary three dimensional body are described with modifications to include the effects of boundary layer displacement thickness, a nonuniform onset flow field (such as that due to a rotating propeller), and the presence of air intakes and exhausts. A simple, reliable, largely automated scheme to better define or change the shape of a body is also presented. A technique was developed which can yield physically acceptable skin friction and pressure drag coefficients for isolated light aircraft bodies. For test cases on a blunt nose Cessna 182 fuselage, the technique predicted drag reductions as much as 28.5% by body recontouring and proper placements and sizing of the cooling air intakes and exhausts. M.G.

N83-16289*# North Carolina State Univ., Raleigh.
A STUDY OF OPTIMUM COWL SHAPES AND FLOW PORT LOCATIONS FOR MINIMUM DRAG WITH EFFECTIVE ENGINE COOLING, VOLUME 2
Stan R. Fox and Frederick O. Smetana Nov. 1980 203 p refs (Grant NsG-1584)
(NASA-CR-159380; NAS 1.26:159380) Avail: NTIS HC A10/MF A01 CSCL 01A

The listings, user's instructions, sample inputs, and sample outputs of two computer programs which are especially useful in obtaining an approximate solution of the viscous flow over an arbitrary nonlifting three dimensional body are provided. The first program performs a potential flow solution by a well known panel method and readjusts this initial solution to account for the effects of the boundary layer displacement thickness, a nonuniform but unidirectional onset flow field, and the presence of air intakes and exhausts. The second program is effectually a geometry package which allows the user to change or refine the shape of a body to satisfy particular needs without a significant amount of human intervention. An effort to reduce the cruise drag of light aircraft through an analytical study of the contributions to the drag arising from the engine cowl shape and the foward fuselage area and also that resulting from the cooling air mass flowing through intake and exhaust sites on the nacelle is presented. The programs may be effectively used to determine the appropriate body modifications or flow port locations to reduce the cruise drag as well as to provide sufficient air flow for cooling the engine. Author

N83-16290*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A 17-PERCENT-THICK MEDIUM SPEED AIRFOIL DESIGNED FOR GENERAL AVIATION APPLICATIONS
Robert J. McGhee and William D. Beasley Dec. 1980 87 p refs
(NASA-TP-1786; L-13900; NAS 1.60:1786) Avail: NTIS HC A05/MF A01 CSCL 01A

Wind tunnel tests were conducted to determine the low speed two dimensional aerodynamic characteristics of a 17 percent thick medium speed airfoil (MS(1)-0317) designed for general aviation applications. The results were compared with data for the 17 percent thick low speed airfoil (LS(1)-0417) and the 13 percent thick medium speed airfoil (MS(1)-0313). Theoretical predictions of the drag rise characteristics of this airfoil are also provided. The tests were conducted in the Langley low turbulence pressure tunnel over a Mach number range from 0.10 to 0.32, a chord Reynolds number range from 2 million to 12 million, and an angle of attack range from about -8 to 20 deg. M.G.

N83-16291*# National Aeronautics and Space Administration, Washington, D. C.
THE CALCULATION OF SEPARATED FLOW AT HELICOPTER BODIES
G. Polz May 1982 28 p refs Transl. into ENGLISH of "Zur Berechnung der Abgelosten Stromung an Hubschrauberrumpfen" DGLR-Paper-81-026 DGLR, Aachen, 11-14 May 1981 p 1-26 Previously announced as A81-47555 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Messerschmitt-Boelkow-Blohm G.m.b.H., Munich
(Contract NASw-3541)
(NASA-TM-76715; NAS 1.15:76715) Avail: NTIS HC A03/MF A01 CSCL 01A
For abstract see A81-47555.

N83-16292 Royal Aircraft Establishment, Farnborough (England).
FINITE DIFFERENCE CALCULATION OF AN INVISCID TRANSONIC FLOW OVER OSCILLATING AIRFOILS
T. Ishiguro Jun. 1982 44 p refs Transl. into ENGLISH of Rept. TR-632 Japan National Aerospace Lab., Tokyo, Oct. 1980
(RAE-Trans-2087; BR86199) Copyright. Avail: Issuing Activity

A procedure is presented to calculate the compressible inviscid unsteady transonic flow over an airfoil, which oscillates sinusoidally in pitch. The exterior of the airfoil-shaped contour in the physical plane is mapped onto a rectangle in a computational plane. The two dimensional unsteady Euler equations are solved there by the Lax-Wendroff finite difference scheme with artificial viscosity. Test calculations were made for the unsteady flows over the Joukowski airfoil and the NACA 0012 airfoil oscillating in pitch, in order to obtain several individual flow patterns. Author

N83-16293# Lancaster Analytics, North Canton, Ohio.
NAVAL AIRSHIP PROGRAM FOR SIZING AND PERFORMANCE (NAPSAP), COMPUTER PROGRAM DEVELOPMENT: PROGRAM UPDATE NUMBER 2 Final Report
Jon W. Lancaster 1 Oct. 1982 77 p refs
(Contracts N62269-81-M-3248; N62269-80-M-2376)
(AD-A120830; LA-TR-4; NADC-81218-60) Avail: NTIS HC A05/MF A01 CSCL 01/3

A computer program called NAPSAP, for Naval Airship Program for Sizing and Performance, performs preliminary vehicle design and performance evaluations for both rigid and non-rigid Lighter Than Air (LTA) vehicles. Program capabilities have been tailored to vehicle sizes and missions currently being investigated as part of the joint U.S. Navy - U.S. Coast Guard Maritime Patrol Airship, MPAS, Program and U.S. Navy Operational Mission Applications. The program has been designed to operate on a minimum of input data (only five cards are necessary) but has the capability to examine the influence of some 40 key parameters. Once the design section of NAPSAP converges on a vehicle which meets the input requirements (such as maximum speed, payload, endurance, etc.) this vehicle can then be operated against a

specified mission profile. Program developments include the addition of more detailed static aerodynamic coefficients, configuration/geometry details, static weight and balance calculations and the capability to analyze mission performance in towing operations in considerable detail. In its present form core memory size is 150K octal words on CD 6600 or 600 K bytes on IBM equipment. Normal run time is less than 4.0 CPU seconds. GRA

N83-16294# Dayton Univ., Ohio. Research Inst.
THE INTEGRAL EQUATION METHOD FOR TRANSONIC FLOW INTERPRETED AS METHOD OF WEIGHTED RESIDUALS Interim Report, Jan. 1980 - Aug. 1981
Karl G. Guderley Wright-Patterson AFB, Ohio AFWAL Sep. 1982 100 p refs
(Contract F33615-81-K-3216; AF Proj. 2304)
(AD-A120206; AFWAL-TR-82-3060) Avail: NTIS HC A05/MF A01 CSCL 20/4

The integral equation method for transonic flow, originally suggested by Oswatitsch and extended by Spreiter, Zierep, Hancock and Nixon is interpreted as a method of weighted residuals. The underlying mathematical concepts are developed in several appendices. This interpretation makes it possible to combine the method with other weighted residual approaches, for instance, finite difference or finite element methods. The latter methods, because of their strongly-localized character are particularly well-suited to treat the transition through the sonic line and shocks. The integral equation method is best in the subsonic part of the flow field. Using the integral equation method only in far field, one obtains far field conditions which approximately take into account nonlinear terms even in the far field, and, therefore, are more accurate than far field conditions so far available in the literature. GRA

N83-16295# Lockheed Missiles and Space Co., Palo Alto, Calif.
NUMERICAL TECHNIQUES FOR HIGH INCIDENCE REENTRY AERODYNAMICS Quarterly Progress Report, 24 Jun. 1982 - 23 Jun. 1983
R. Whitehead and R. Conti 22 Sep. 1982 4 p
(Contracts N00014-82-C-0690; N00014-81-C-0380)
(AD-A120350; QPR-1) Avail: NTIS HC A02/MF A01 CSCL 12/1

The overall objectives of this project are to investigate the limits of applicability of the present techniques and to extend those limits in order to cover the full range of incidence encountered by the reentry vehicles of the Fleet Ballistic Missile (FBM) System. Research indicates that the aforementioned limit in angle of attack is created by the lack of proper modeling of the base flow, which develops strong communication with the windward side at high incidence, when the flow there becomes subsonic. Therefore, the effort to extend the limits of applicability of the numerical techniques should focus on better modeling of the base flow. To this effect, the activities during the first quarter consisted of numerical simulation of base flow. GRA

N83-16296# Naval Surface Weapons Center, Dahlgren, Va. Exterior Ballistics Branch.
PROCEDURE FOR DETERMINING AERODYNAMIC DRAG AND G PROFILE OF A MISSILE USING UNSMOOTHED POSITION DATA Final Report
L. J. McAnelly and J. E. Mitchell Aug. 1982 48 p refs
(AD-A120611; NSWC/TR-82-231) Avail: NTIS HC A03/MF A01 CSCL 20/4

A procedure is described for determining the areodynamic drag and G profile of a missile using unsmoothed observed position data. The procedure uses numerical integration in computing trajectory data that simulates the observed data. An iterative process is used to obtain a reasonable match between the computed and observed trajectory data. The aerodynamic drag used in computing the trajectory that matches the observed data is a good estimate of the drag of the missile. The G profile is included in the computation. An example is given where the procedure was applied to a B61 Mod 0 bomb deployed in the retarded laydown mode. The results obtained with this procedure are compared to the results obtained using two different smoothing techniques. GRA

N83-16297# Naval Research Lab., Washington, D. C.
VORTEX SHEDDING FROM A VIBRATING CABLE WITH ATTACHED SPHERICAL BODIES IN A LINEAR SHEAR FLOW Final Report
R. D. Peltzer 27 Oct. 1982 132 p refs
(F60534)
(AD-A120586; NRL-MR-4940) Avail: NTIS HC A07/MF A01 CSCL 20/4

Marine cables often comprise an integral part of a larger structural system, such as an offshore drilling platform. They are also used to support marker buoys, as well as anchored or towed instrument arrays. Consequently, the resonant flow-induced oscillations of these cables, caused by vortex shedding, are extremely undesirable because of the associated damaging phenomena. The present study, which employs hot wire anemometry as the principal investigative tool, was undertaken to examine the behavior in the near wake of a flexible, helically wound, high aspect ratio (L/d = 107) marine cable in a linear shear flow (steepness parameter beta = 0.0053) at centerline Reynolds numbers between 2.0 x 1000 < or = Rec 4.2 x 1000. Particular attention was paid to lock-on or 'synchronization' related changes associated with uniform and sheared flow past the cable when it was forced to vibrate in the first mode. The study was extended to include an analysis of the effects on vortex shedding synchronization phenomena generated by placing spherical bluff bodies along the cable span. The frequency and reduced velocity boundaries of the lock-on regions, for both the cable and sphere-cable combination, as a function of vibration amplitude up to a/d = 0.322, were measured, plotted and analyzed. The critical reduced velocity of the vibrating was Ur* = 5.50, and for the sphere-cable combination Ur* = 3.39. A sudden increase in the vortex formation length in the near wake of the vibrating cable occurred during perfect synchronization (Ur* = 5.50). Shortly thereafter, the formation length returned to stationary cable values. GRA

N83-16298# Sandia Labs., Albuquerque, N. Mex.
TWO-DIMENSIONAL, SUBSONIC FLOWFIELD ANALYSIS FOR ARBITRARY BOUNDARIES WITH LIFTING BODIES
R. W. Noack and D. J. Norton (Texas A and M Univ., College Station) 1982 10 p refs Presented at the 20th Aerospace Sci. Conf., Orlando, Fla., 11 Jan. 1982
(Contract DE-AC04-76D-00789)
(DE82-003577; SAND-81-1371C; CONF-820106-2) Avail: NTIS HC A02/MF A01

A computational method suitable for analyzing flowfields about lifting bodies in free air and within the confines of arbitrary shaped ducts is presented. The method utilizes a compressible, perturbation stream function in a Cartesian formulation and is restricted to two dimensional, subcritical, isentropic flows. The pertinent boundary conditions are presented. Comparisons are made with results obtained from exact analytical solutions and numerical methods. These comparisons show the method gives good results for a similar number of grid points. Results are also presented for a lifting airfoil in tunnels with straight and shaped walls. DOE

N83-16299# Rolls-Royce Ltd., Derby (England).
SHOCK-WAVE OSCILLATIONS IN TRANSONIC FLOW
Klaus Finke Dec. 1981 52 p Transl. into ENGLISH from VDI (West Germany), no. 580
(PNR-90138; Trans-15947; TLT-00849) Avail: NTIS HC A04/MF A01

Shock oscillations were experimentally observed on thick profiles at high angles of attack, thick biconvex circular arc airfoils, circular cylinders and other geometries in transonic flows. Alternating separation and attachment at the leading edge is the severest type of unsteady flow condition on lifting airfoils. Large periodical disturbances exist throughout the entire flow field with defined phase shifts. Four physical mechanisms which explain the wave pattern compare well with theoretical results of Dvorak and with the theory of transonic aileron buzz. It is demonstrated how

shock oscillations can be fully suppressed by techniques such as suction and tangential blowing. Author (ESA)

N83-16300# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
LASER-DOPPLER VELOCIMETER (LDV) MEASUREMENTS OF THE VELOCITY FIELD OF A LEADING EDGE VORTEX OVER A DELTA WING BEFORE AND AFTER VORTEX BREAKDOWN
K. Anders Mar. 1982 34 p refs
(VKI-TN-142) Avail: NTIS HC A03/MF A01

The results of velocity measurements in the flow field over a delta wing with aspect ratio 1.6 at angles of attack 19.3 deg and 28.9 deg are given. The experiments were performed with laser Doppler velocimetry in backscatter mode. Only 50% of maximum laser power was used. Measurements were made in a nonburst as well as in a burst vortex. The experiments were carried out in the L-2B low speed tunnel at free stream velocities of 18 m/s to 19.5 m/sec. The results are compared with theoretical calculations of the velocity distribution by Hall and Ludwieg and Ludwieg's stability theory of vortex breakdown. The assumption of a conical flow within the vortex was proved to be valid except near the trailing edge. The axisymmetry of the flow field could not be proved. Deviation of the measured velocity distribution from an ideal Hall vortex is probably due to vortex asymmetry. Author (ESA)

N83-16301# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
THE WAKE OF A SIDESLIPPING WING IN LOW SPEED FLOW
E. Meineke Jun. 1982 36 p refs Sponsored by German Ministry of Defence
(VKI-TN-143) Avail: NTIS HC A03/MF A01

Flow fields of moderate aspect ratio wings under the influence of sideslip were studied. Flow velocity and local total pressure were measured at a large number of measuring points in rectangular control regions perpendicular to the free stream. Detailed pictures were obtained of the vortical wake formed by vortex sheets shed from the lifting wing and rolling up from its free edges, and of the viscous wake revealed by regions of high total pressure loss. The investigation, completed by measurements in the vicinity of the tips and flow visualizations, shows that an important contribution to the development of a flow field with sideslip comes from the flow around the tips. Comparison with results of the British Aerospace Hunt-Semple panel program (which, on the basis of an inviscid flow model and supplemented by a wake relaxation algorithm, provides flow field data) suggests that at least qualitatively, the simulation of the experimental results by computation is possible. Author (ESA)

N83-16302# Bristol Univ. (England). Dept. of Aeronautical Engineering.
GALLOPING OF BLUFF BODIES B.S. Thesis
W. C. Cheung and W. C. Man Jun. 1982 81 p refs
(BU-272) Avail: NTIS HC A05/MF A01

Six slender square section cylinders, each with different corner radii, were investigated statically and dynamically in smooth and turbulent flows. By progressively rounding off the four corners of a square section, the drag force is reduced substantially, particularly in smooth flow. However, the effect of increasing the radius of corners after critical values is less significant. Also, this effect becomes less profound as turbulence is introduced in the flow. The validity of quasi-steady theory, using the experimental aerodynamic coefficients, to explain the observed aeroelastic instability of bluff cylinders in a uniform stream is justified by the good agreement between the theoretical predictions and the dynamic test data, when only plunging oscillation is allowed. It is shown that quasi-static and dynamic results in different parts of an inhomogeneous flow correspond, but no generalized conclusions on the effects of corner radius and turbulence are possible. Author (ESA)

N83-16303# Bristol Univ. (England). Dept. of Aeronautical Engineering.
A LABORATORY METHOD FOR THE ANALYSIS OF HELICOPTER UNDERSLUNG LOAD OSCILLATIONS B.S. Thesis
V. Poon and J. Soon Jun. 1982 115 p refs
(BU-273) Avail: NTIS HC A06/MF A01

A reliable method based on strain gage measurements was developed for recording the motions, frequencies and other relevant information, e.g., drag forces of the underslung loads when oscillating in a wind tunnel. The effects of fixed and moving supports on the underslung load motions, and hence on its stability characteristics, were studied at Reynolds number and Froude number of 68,000 and 6.5 respectively. A definite difference in the types of motions of the load is observed. This suggests that a moving support is required if accurate results on the underslung load stability characteristic are to be obtained using the wind tunnel. Author (ESA)

N83-16304# Bristol Univ. (England). Dept. of Aeronautical Engineering.
AN INVESTIGATION INTO THE TRANSIENT PRESSURE REDISTRIBUTION AROUND AN AEROFOIL DUE TO THE ROTATION OF A SPOILER B.S. Thesis
M. J. Davie and M. J. Davies Jun. 1982 57 p refs
(BU-274) Avail: NTIS HC A04/MF A01

The unsteady aerodynamics, around an airfoil, associated with the actuation of a spoiler were studied. Deployment angles of 0, 30 and 60 deg were selected between which both opening and closing dynamics of the spoiler induced pressures were recorded. All tests were performed on a two dimensional NACA 0012-64 airfoil of 40 cm chord, placed in an open working-section wind tunnel. Although the accuracy of the unsteady results was poor, general trends are established. The unsteady aerodynamics local to the spoiler due to its rotation are not strongly dependent upon the spoiler position. Downstream of the spoiler the pressurer response time is dependent upon the ambient transport time of the fluid, whereas upstream the response times are dependent upon the convective speed associated with the blockage effect. On the surface opposite to the spoiler the results are constant, with a clear indication that there is an influence upon these from the trailing edge (Kutta condition). Author (ESA)

N83-16305# Bristol Univ. (England). Dept. of Aeronautical Engineering.
AN INVESTIGATION AND COMPARISON OF THE AERODYNAMIC PERFORMANCE OF SELECTED HANG-GLIDER AIRFOIL SECTIONS B.S. Thesis
G. P. Hanson and S. W. McLaren Jun. 1982 65 p refs
(BU-276) Avail: NTIS HC A04/MF A01

Tests were made on two dimensional full scale wind tunnel models of hang glider airfoil sections with end plates at Re = 720,000 based on chord. Aerodynamic force coefficients were determined by analysis of pressure distributions measured using a pressure transducer, through a chordline incidence range of -10 to 30 deg. Seven models of various cambers and thickness-to-chord ratios, constructed in a similar manner to contemporary hang gliders, were tested. Comparisons of the glide angle and sinking speed behavior throughout the incidence range are made with a contemporary hang glider airfoil section. Improvements to minimum glide angle, minimum sinking speed and maximum lift are made, but usually to the detriment of other aspects of the performance. Author (ESA)

N83-16306# Bristol Univ. (England). Dept. of Aeronautical Engineering.
A STUDY OF THE FLOW AROUND A SLOTTED FLAP END B.S. Thesis
K. J. Harper and J. R. Sleeman Jun. 1982 36 p refs
(BU-279) Avail: NTIS HC A03/MF A01

Chordwise pressure distributions were measured over a two dimensional airfoil section at various spanwise stations relative to the end of a part-span slotted flap, at a Reynolds number of 1.04 times 10 to the 6th power based on the main airfoil chord, for several angles of flap deflection. A single chordwise row of pressure tappings was used on the main airfoil and its position relative to the flap end was adjusted by changing the spanwise

extent of the flap into the flow. Pressure distributions were also recorded over the flap at various stations from its end. These results, together with flow visualization, give a general indication of the flow pattern around the flap end and the effect on the spanwise distribution of lift. Author (ESA)

N83-16307# Karlsruhe Univ. (West Germany). Ausbreitungs-und Transport vorgaenge in Stroemungen.
CALCULATION OF TWO DIMENSIONAL NEAR AND FAR WAKES
V. C. Patel and G. Scheuerer Apr. 1981 33 p refs In ENGLISH; GERMAN summary Original language document announced as A82-34270 Sponsored in cooperation with Iowa Univ. and Alexander von Humboldt Foundation
(SFB-80/T/190) Avail: NTIS HC A03/MF A01
For abstract see A82-34270.

N83-17379*# Alabama Univ., University. Dept. of Physics and Astronomy.
EFFECTS OF THE KELVIN-HELMHOLTZ SURFACE INSTABILITY ON SUPERSONIC JETS
Philip E. Hardee *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 23 p refs Submitted for publication (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 01A

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N83-16308# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
IN-FLIGHT AIRCRAFT SEAT FIRE EXTINGUISHING TESTS (CABIN HAZARD MEASUREMENTS) Final Report, Jun. - Dec. 1981
Richard G. Hill, Louise C. Speitel, C. Huber, G. Johnson, R. Filipczak, T. Gustavino, and C. Sarkos Dec. 1982 46 p refs
(FAA Proj. 181-350-430)
(FAA-CT-82-111) Avail: NTIS HC A03/MF A01

The results of a test program designed to: (1) determine the amount of toxic decomposition byproducts from the use of Halon 1211 on large seat fires in an aircraft cabin while in flight; (2) compare relative hazard levels from the use of common aircraft hand-held extinguishers (Halon 1211, monammonium phosphate, carbon dioxide, water) on large fire in an aircraft cabin while in flight; and (3) compare the hazards from the hand-held extinguishers extinguishing a large aircraft seat fire to the hazards of an uncontrolled seat fire are described. A series of nine tests was conducted during this project. Two tests each were conducted using Halon 1211, dry powder (monammonium phosphate), water and CO2 extinguishers, and one test in which the seat fire was allowed to burn uncontrolled. Hazard level measurements were taken during all tests, they included heat, smoke, and toxic gas measurements. It was concluded that Halon 1211 can be effectively and safely utilized to extinguish a severe seat fire in a transport passenger cabin. Author

N83-16309# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.
AIRCRAFT ACCIDENT REPORT: SUN WEST AIRLINES FLIGHT 104, PIPER PA-31-350(T-1020), N41070, DURANGO-LAPLATA COUNTY AIRPORT, DURANGO, COLORADO, DECEMBER 31, 1981
4 Nov. 1982 28 p refs
(PB82-910413; NTSB-AAR-82-13) Avail: NTIS HC A03/MF A01 CSCL 01C

Sun West Airlines Flight 104, a scheduled passenger service commuter air carrier flight departed Albuquerque, New Mexico, at 1855 mountain standard time on December 31, 1981, with five passengers and one pilot aboard for a flight to Durango, Colorado. The en route portion of the flight, conducted under instrument flight rules, was normal. Flight 104 was cleared by Denver Air Route Traffic Control Center at 1951:37 for a VOR approach to Durango-La Plata County Airport. Radar service was terminated at 1953:30, when the flight was about 3 miles northeast of the Aztec Intersection on the VOR approach. About 2000 hours, ground witnesses observed Flight 104 fly over the airport in a northerly direction about over the the VOR transmitter (missed approach point) adjacent to the runway midpoint. The airplane descended and crashed about 1,350 feet east of the departure end of runway 2, about 3,250 feet from the VOR. The airplane was destroyed by impact and postimpact fire. The pilot and three passengers were killed and two passengers were seriously injured in the accident. Weather at the time of the accident was reported as "indefinite ceiling 400 feet sky obscured, 1 mile visibility in light snow and fog, with calm winds." The National Transportation Safety Board was unable to determine the probable cause of this accident, which occurred during an attempted missed approach. A low ceiling and poor visibility were factors which contributed to the accident. Author

N83-16310# Naval Submarine Medical Research Lab., Groton, Conn.
DESIRABLE CHARACTERISTICS OF UNDERWATER LIGHTS FOR HELICOPTER ESCAPE HATCHES Interim Report
S. M. Luria, Bernard L. Ryack, and David F. Neri 22 Sep. 1982 30 p refs
(AD-A120331; NSMRL-990) Avail: NTIS HC A03/MF A01 CSCL 06/7

To specify the desirable characteristics of lighting around helicopter escape hatches which must be visible under water, tests were carried out of several types of lights. The optimal arrangement of lights around the hatch, their minimum and maximum intensity, the effects of viewing angle on their visibility, the effects of the dimensions of the lights, and the variations in the intensity of the electro-luminescent panels with changes in the power supplied were determined. Suggestions for lighting specifications are given. Author (GRA)

N83-16311# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biomechanical Protection Branch.
VERTICAL IMPACT TESTS OF A MODIFIED F/FB-111 CREW SEAT TO EVALUATE HEADREST POSITION AND RESTRAINT CONFIGURATION EFFECTS
James W. Brinkley, Bernard F. Hearon, James H. Raddin, Jr., Lawrence A. McGowan, and Joseph M. Powers Aug. 1982 296 p refs
(AF Proj. 7231)
(AD-A120255; AFAMRL-TR-82-51) Avail: NTIS HC A13/MF A01 CSCL 06/19

A test program was conducted to evaluate the effects of changes in (1) fore-aft headrest position, (2) upper extremity bracing, and (3) restraint harness configuration on human response to vertical impact. One-hundred and fifteen human tests were performed on the Vertical Deceleration Tower up to an impact level of 10.5 G mean (std dev = 0.14), 26 ft/sec velocity change. Subjects were restrained in either a proposed, modified F/FB-111 crew seat and restraint system or a conventional double shoulder strap - lap belt restraint harness and were exposed to comparable impacts in different upper extremely bracing conditions and at different fore-aft headrest adjustments. Measured data included seat acceleration and velocity, head and chest translational acceleration components, tri-axial forces acting on the seat and footrest, forces acting in the restraint harness attachments, and displacements of various body segments. Parametric analysis of the test results was conducted using the Wilcoxon paired-replicate rank test. With the headrest 2 1/4 inches forward of the plane of the seat back, there was increased forward and downward head rotation compared to the headrest 1 inch aft of the seat pack plane. With the headrest 1 inch aft of the plane of the seat pack, there was increased forward-translation of the head compared to the headrest 2 1/4 inches forward of the seat back plane. Subjects

utilizing the hands-on-knees bracing position were found to carry a greater proportion of the load through the extremities to the footrest, thereby unloading the vertebral column, than subjects using the hands-in-lap position. GRA

N83-16312# Naval Submarine Medical Research Lab., Groton, Conn.
DESIRABLE CHARACTERISTICS OF UNDERWATER LIGHTS FOR HELICOPTER ESCAPE HATCHES Interim Report
S. M. Luria, Bernard L. Ryack, and David F. Neri 22 Sep. 1982 30 p refs
(Contract N62269-82-WR-00232)
(AD-A120510; NSMRL-990) Avail: NTIS HC A03/MF A01 CSCL 06/7

To specify the desirable characteristics of lighting around helicopter escape hatches which must be visible under water, tests were carried out of several types of lights. The optimal arrangement of lights around the hatch, their minimum and maximum intensity, the effects of viewing angle on their visibility, the effects of the dimensions of the lights, and the variations in the intensity of the electro-luminescent panels with changes in the power supplied were determined. Suggestions for lighting specifications are given. Author (GRA)

N83-16313# Sandia Labs., Albuquerque, N. Mex.
SANDIA AIRCRAFT CRASHFIRE FACILITY
Walt Gill 1981 36 p Presented at the IMOG Environ. Testing Meeting, Amarillo, Tex., 6 Oct. 1981
(Contract DE-AC04-76DP-00789)
(DE82-004297; SAND-81-2577C; CONF-8110124-2) Avail: NTIS HC A03/MF A01

The design and operation of a facility at Sandia Laboratories for simulating aircraft fuel fires and for determining the effects of such fires on explosives and on aircraft-transportable accident-resistant containers for plutonium pellets are described. DOE

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N83-16314# SRI International Corp., Menlo Park, Calif.
OCEANIC AREA SYSTEM IMPROVEMENT STUDY (OASIS). VOLUME 1: EXECUTIVE SUMMARY AND IMPROVEMENT ALTERNATIVES DEVELOPMENT AND ANALYSIS Final Report
G. J. Couluris and B. Conrad Sep. 1981 402 p refs 10 Vol.
(Contract DOT-FA79WA-4265; SRI Proj. 8066)
(FAA-EM-81-17-Vol-1) Avail: NTIS HC A18/MF A01

The technical, operational, and economic feasibilities of developing and applying potential improvements to air traffic services (ATS) in selected oceanic and low air traffic density areas, while maintaining or enhancing the level of safety are assessed. The improvements of primary concern are those that can enhance separation assurance services and reduce overall operating costs. Flight operating costs may be decreased by reducing constraints imposed by current separation minima. The improvements address communication, navigation, surveillance, and self contained airborne separation assurance functions and associated operating procedures. Quantitative data that can be used by the world aviation community to narrow significantly the choices for improving ATS systems in oceanic areas of the world and in other areas where similar systems can enhance air traffic services is provided. The data is based both on economic assumptions and forecasts, and on analyses or judgments of the feasibility of achieving certain of the technical improvements sought. S.L.

N83-16315# SRI International Corp., Menlo Park, Calif.
OCEANIC AREA SYSTEM IMPROVEMENT STUDY (OASIS). VOLUME 2: NORTH ATLANTIC REGION AIR TRAFFIC SERVICES SYSTEM DESCRIPTION Final Report
G. J. Couluris Sep. 1981 167 p refs 10 Vol.
(Contract DOT-FA79WA-4265; SRI Proj. 8066)
(FAA-EM-81-17-Vol-2) Avail: NTIS HC A08/MF A01

The ATS system in the North Atlantic oceanic region (NAT) is described, and the services discussed. Radar surveillance of NAT airspace is not conducted due to the lack of ground sites for antennae, and ATS personnel use pilot position reports to monitor oceanic flights. These voice reports are transmitted at least once per hour. Direct air-ground communications between oceanic aircraft and ATS personnel are generally not available. Instead, the ATS units are supported by communication (COM) stations which operate very high frequency and long range, high frequency radio facilities. These COM stations relay messages between pilots and ATS unit pesonnel. The stations are usually located separately from the ATS units. The ATS units and COM stations, as well as airline, military, meteorological, and other aviation facilities, are connected by the aeronautical fixed telecommunications network which provides teletype service, and ATS direct speech circuits. S.L.

N83-16316# SRI International Corp., Menlo Park, Calif.
OCEANIC AREA SYSTEM IMPROVEMENT STUDY (OASIS). VOLUME 3: CENTRAL EAST PACIFIC REGION AIR TRAFFIC SERVICES SYSTEM DESCRIPTION Final Report
G. J. Couluris Sep. 1981 66 p refs 10 Vol.
(Contract DOT-FA79WA-4265; SRI Proj. 8066)
(FAA-EM-81-17-Vol-3) Avail: NTIS HC A04/MF A01

The air traffic services (ATS) system in the Central East Pacific (CEP) region is described. This system provides ATC, flight information, and alerting services to aircraft in oceanic control areas flight information regions. The operations, technical components, and costs of the ATS units are addressed. S.L.

N83-16317# SRI International Corp., Menlo Park, Calif.
OCEANIC AREA SYSTEM IMPROVEMENT STUDY (OASIS). VOLUME 4: CARIBBEAN REGION AIR TRAFFIC SERVICES SYSTEM DESCRIPTION Final Report
G. J. Couluris Sep. 1981 122 p refs 10 Vol.
(Contract DOT-FA79WA-4265; SRI Proj. 8066)
(FAA-EM-81-17-Vol-4) Avail: NTIS HC A06/MF A01

The air traffic service provided in the Caribbean region (CAR) is addressed. These ATS units use to varying extent the communication, navigation, and surveillance systems that are common to most domestic airspace areas; these systems include very high frequency air-ground voice radio, ground based radio navigation aids and radar surveillance. The radio navigation aids support a system of fixed ATS routes which criss-cross the CAR and are commonly used by flights in the region. S.L.

N83-16318# SRI International Corp., Menlo Park, Calif.
OCEANIC AREA SYSTEM IMPROVEMENT STUDY (OASIS). VOLUME 5: NORTH ATLANTIC, CENTRAL EAST PACIFIC, AND CARIBBEAN REGIONS COMMUNICATION SYSTEMS DESCRIPTION Final Report
B. Conrad Sep. 1981 109 p refs 10 Vol.
(Contract DOT-FA79WA-4265; SRI Proj. 8066)
(FAA-EM-81-17-Vol-5) Avail: NTIS HC A06/MF A01

Oceanic communications required to support aviation in selected portions of the North Atlantic (NAT), Central East Pacific (CEP), and Caribbean (CAR) areas involve many elements including ground-to-ground communications between air traffic control facilities and available, and air-to-ground communications using very high frequency where available; communications are often conducted by special radio stations which relay messages to air traffic controllers. The NAT is serviced by six major communication stations and the CEP by two. The CAR has a number of domestic service stations and control facilities providing VHF and HF communications to the majority of flights, and at least two major

centers providing HF communications for long range over water operations. S.L.

N83-16319# SRI International Corp., Menlo Park, Calif.
OCEANIC AREA SYSTEM IMPROVEMENT STUDY (OASIS). VOLUME 7: NORTH ATLANTIC REGION FLIGHT COST MODEL RESULTS Final Report
G. J. Couluris, J. C. Bobick, and J. D. Tornow Sep. 1981 103 p 10 Vol.
(Contract DOT-FA79WA-4265; SRI Proj. 8066)
(FAA-EM-81-17-Vol-7) Avail: NTIS HC A06/MF A01

The NAT air traffic flight costs are analyzed, based on results obtained from the computerized flight cost model (FCM). The flight costs associated with present and alternative ATC separation minima are estimated. Data, generated by the FCM, which describe flight operating characteristics, including route and flight level utilization and diversions are presented. S.L.

N83-16320# SRI International Corp., Menlo Park, Calif.
OCEANIC AREA SYSTEM IMPROVEMENT STUDY (OASIS). VOLUME 8: CENTRAL EAST PACIFIC REGION FLIGHT COST MODEL RESULTS Final Report
D. B. Koretz and G. J. Couluris Sep. 1981 90 p 10 Vol.
(Contract DOT-FA79WA-4265; SRI Proj. 8066)
(FAA-EM-81-17-Vol-8) Avail: NTIS HC A05/MF A01

The flight cost model (FCM) is a set of computer programs prepared especially for the OASIS project to estimate flight operating costs. The FCM was used to simulate the operations of the Central East Pacific (CEP) air traffic services system and several other system operating alternatives (representing alternative separation minima) on a representative July (peak) day and a representative November (off peak) day. The July sample day operation in each of the three sample years was simulated for eight system alternatives. The November sample day in each year was simulated only for the present system for comparison purposes. S.L.

N83-16321# SRI International Corp., Menlo Park, Calif.
OCEANIC AREA SYSTEM IMPROVEMENT STUDY (OASIS). VOLUME 9: FLIGHT COST MODEL DESCRIPTION Final Report
K. Y. Wang and D. A. DEsopo Sep. 1981 108 p 10 Vol.
(Contract DOT-FA79WA-4265; SRI Proj. 8066)
(FAA-EM-81-17-Vol-9) Avail: NTIS HC A06/MF A01

The functional and logical structure of the flight cost model (FCM) computer program modules which were developed to simulate air traffic operations in oceanic areas is described. The FCM modules include the: network generating routine, track setting routine, meteorology routine, flight planning model, flight tracking model and report generating package. The organization of each and the interrelation between these programs are addressed. S.L.

N83-16322# SRI International Corp., Menlo Park, Calif.
OCEANIC AREA SYSTEM IMPROVEMENT STUDY (OASIS). VOLUME 10: NORTH ATLANTIC, CENTRAL EAST PACIFIC, AND CARIBBEAN REGIONS AVIATION TRAFFIC FORECASTS Final Report
C. Starry and J. D. Tornow Sep. 1981 375 p 10 Vol.
(Contract DOT-FA79WA-4265; SRI Proj. 8066)
(FAA-EM-81-17-Vol-10) Avail: NTIS HC A16/MF A01

Aircraft movements for a busy day and traffic forecasts for July and November busy days for the NAT and CEP are described. The forecasts should be regarded as consensus forecasts that reflect the aviation industry's best judgment concerning the outlook for air traffic and technology. S.L.

N83-16323# Mitre Corp., McLean, Va.
CONFLICT MONITORING ANALYSIS OF PARALLEL OPPOSITE DIRECTION ROUTES, VOLUME 2
Arthur P. Smith, III Aug. 1982 67 p refs 2 Vol.
(Contract DTFA01-82-C-10003)
(AD-A120187; MTR-82W00114-Vol-2; FAA-EM-82-23-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 17/7

This paper reports on the development of the Conflict Monitoring Analysis. A previous report (FAA-EM-80-16) described the estimates of the probability of horizontal overlap and controller intervention rate for some direction adjacent parallel routes. This work extends that methodology to opposite direction adjacent parallel routes. For both the probability of horizontal overlap and the controller intervention rate, trial results based on data are given. Author (GRA)

N83-16324# Amron Corp., Fairfax, Va.
LOW-COST NAVIGATION SYSTEMS FOR LONG-LIFE DRIFTING BUOYS Final Report, 1 Jan. - 30 Jun. 1982
Albert H. Terp 30 Jul. 1982 34 p
(Contract N00014-82-C-0120)
(AD-A120621; ATR-82-129-7A) Avail: NTIS HC A03/MF A01 CSCL 17/7

Fourteen off-the-shelf navigation systems were considered for use in long-life, drifting buoys to provide localization information. Cost, power consumption, accuracy, capability for remote initialization, and packaging suitability for buoy use were used as criteria in the evaluation. Three U.S. manufactured systems were selected in a two-stage preliminary review; two of these systems were purchased and tested in a laboratory and the other was evaluated on the basis of technical information supplied by the manufacturer. All three systems, the Magnavox MX-4102; the Navigation Communication Systems Meridian unit, and the Tracor Bridgestar, met or exceeded the criteria for long-life drifting buoy use. An at-sea test is recommended as the next step in demonstrating their suitability. GRA

N83-16325# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RADIO NAVIGATION AND AIRPLANE NAVIGATION
Yu-Cai Wang 17 Aug. 1982 16 p Transl. into ENGLISH from Hangkong Zhishi (China), Apr. 1982 p 2-4
(AD-A120595; FTD-ID(RS)T-0870-82) Avail: NTIS HC A02/MF A01 CSCL 17/7

The development of radio navigation technology in modern aviation is discussed. The principles and uses of various types of radio navigation in use today are outlined. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-16326 Royal Aircraft Establishment, Farnborough (England).
FLYING AND DESIGN OF AIRCRAFT
J.-C. Wanner Nov. 1981 18 p refs Transl. into ENGLISH from Aeron. et Astron. (France), vol. 40, 1973 p 10-18
(RAE-Trans-2070; BR85535) Copyright. Avail: Issuing Activity

Technical specifications for the Concorde were reviewed in order to ensure the safety of its missions. Most of the old rules of thumb generally used for the conventional aircraft appeared as obsolete or unapplicable to a supersonic transport. In order to develop the definition of these regulations, a theoretical method was developed for evaluating the reliability of these manned aerospace vehicles. This method called ESAU, is based on an investigation of the occurrence of accidents. An accident is due to a set of incidents which can be classified into only three different types. The study of each type of incident, and the probability of occurrence, which has to be reduced in order to increase the safety, is very useful to the designer of a project when choosing between possible solutions, taking into account the reliability of the systems, the possibility human errors, and flight conditions. S.L.

N83-16327 Aeronautical Research Labs., Melbourne (Australia). Mechanical Engineering Dept.

COCKPIT TEMPERATURES AND COOLING REQUIREMENTS OF A PACKED AIRCRAFT

Neil J. Repacholi and Brian Rebbechi Nov. 1981 27 p refs
(ARL-Mech-Eng-Note-388; AR-002323) Avail: Issuing Activity

The cockpit and metal surface temperatures of a parked Sabre aircraft exposed to high air temperatures and solar radiation loads. Results were obtained both with and without cooling air supplied to the cockpit; these results have been used to formulate a mathematical model of the cockpit heat balance. Author

N83-16328*# National Aeronautics and Space Administration, Washington, D. C.

THE HALF-MODEL TECHNIQUE IN THE WIND TUNNEL AND ITS EMPLOYMENT IN THE DEVELOPMENT OF THE AIRBUS FAMILY

Herbert Peter Franz Aug. 1982 38 p refs Transl. into ENGLISH of "Die Halbmodelltechnik im Windkanel und ihre Anwendung bei der Entwicklung der Airbus-Familie" rept. DGLR-Paper-81-118 Deutsche Gesellschaft fuer Luft- und Ramfahrt, Aachen, 11-14 May 1981 p 1-38 Previously announced in IAA as A81-47587 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76970; NAS 1.15:76970; DGLR-Paper-81-118) Avail: NTIS HC A03/MF A01 CSCL 01C

For abstract see A81-47587.

N83-16329*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.

AN ON-BOARD NEAR-OPTIMAL CLIMB-DASH ENERGY MANAGEMENT Interim Report

Alan R. Weston, Eugene M. Cliff, and Henry J. Kelley Dec. 1982 122 p refs
(Grant NAG1-203)
(NASA-CR-169755; NAS 1.26:169755) Avail: NTIS HC A06/MF A01 CSCL 01C

On-board real time flight control is studied in order to develop algorithms which are simple enough to be used in practice, for a variety of missions involving three dimensional flight. The intercept mission in symmetric flight is emphasized. Extensive computation is required on the ground prior to the mission but the ensuing on-board exploitation is extremely simple. The scheme takes advantage of the boundary layer structure common in singular perturbations, arising with the multiple time scales appropriate to aircraft dynamics. Energy modelling of aircraft is used as the starting point for the analysis. In the symmetric case, a nominal path is generated which fairs into the dash or cruise state. Feedback coefficients are found as functions of the remaining energy to go (dash energy less current energy) along the nominal path. S.L.

N83-16330*# Boeing Commercial Airplane Co., Seattle, Wash.

ADVANCED COMPOSITE ELEVATOR FOR BOEING 727 AIRCRAFT, VOLUME 2 Final Report

D. V. Chovil, W. D. Grant, E. S. Jamison, H. Syder, O. E. Desper, S. T. Harvey, and J. E. McCarty Nov. 1980 405 p refs
(Contract NAS1-14952)
(NASA-CR-159258; NAS 1.26:159258) Avail: NTIS HC A18/MF A01 CSCL 01C

Preliminary design activity consisted of developing and analyzing alternate design concepts and selecting the optimum elevator configuration. This included trade studies in which durability, inspectability, producibility, repairability, and customer acceptance were evaluated. Preliminary development efforts consisted of evaluating and selecting material, identifying ancillary structural development test requirements, and defining full scale ground and flight test requirements necessary to obtain Federal Aviation Administration (FAA) certification. After selection of the optimum elevator configuration, detail design was begun and included basic configuration design improvements resulting from manufacturing verification hardware, the ancillary test program, weight analysis, and structural analysis. Detail and assembly tools were designed and fabricated to support a full-scope production program, rather than a limited run. The producibility development programs were used to verify tooling approaches, fabrication processes, and inspection methods for the production mode. Quality parts were readily fabricated and assembled with a minimum rejection rate, using prior inspection methods. Author

N83-16331*# Sikorsky Aircraft, Stratford, Conn.

PREDESIGN STUDY FOR A MODERN 4-BLADED ROTOR FOR THE RSRA Final Report

S. Jon Davis Mar. 1981 177 p refs
(Contract NAS2-10691)
(NASA-CR-166155; NAS 1.26:166155) Avail: NTIS HC A09/MF A01 CSCL 01C

A predesign study was conducted to evaluate the feasibility of providing a modern four bladed rotor for flight research testing on NASA's Rotor System Aircraft. The objectives of the proposed tests are to acquire data (for correlation purposes) on the capabilities of a state of the art rotor system and to quantify the contributions of key design parameters to these capabilities. Three candidate rotors were examined: the UH-60A BLACK HAWK rotor with and without root extenders and the H-3 Composite Blade rotor. It was concluded that the technical/cost objectives could best be accomplished using the basic BLACK HAWK rotor (i.e., without root extenders). Further, the availability of three existing sets of blade tip of varying design, together with a demonstrated capability for altering airfoil geometry should provide early research information on important design variables at reduced cost. For planning purpose it is estimated that the proposed rotor system could be available for testing in 24 months after authorization to proceed for a cost of $6.098 million. Author

N83-16332# Calspan Corp., Buffalo, N. Y.

IN-FLIGHT INVESTIGATION OF LARGE AIRPLANE FLYING QUALITIES FOR APPROACH AND LANDING Interim Technical Report, Apr. 1980 - Jul. 1981

Norman C. Weingarten and Charles R. Chalk Wright-Patterson AFB, Ohio AFWAL Sep. 1981 484 p refs
(Contract F33615-79-C-3618; AF Proj. 2403)
(AD-A120202; C-6645-F-5; AFWAL-TR-81-3118) Avail: NTIS HC A21/MF A01 CSCL 01/3

A study of the handling qualities of large airplanes in the approach and landing flight phase was performed. An in-flight simulation experiment utilizing the USAF-AFWAL/Calspan Total In-flight Simulator was carried out to gather data for the analysis effort. A one-million pound statically unstable airplane model was used as a baseline about which variations were made. The primary variables were relative pilot position with respect to center of rotation, command path time delays and phase shifts, augmentation schemes and levels of augmentation. Both longitudinal and lateral-directional characteristics were investigated. The experiment design, conduct of the experiment, and analysis of the data are described. Results are presented in the form of pilot ratings, pilot comments and various analysis techniques. The results indicate that the approach and landing task with very large airplanes is a fairly low bandwidth task. Low equivalent short-period frequencies and relatively long time delays can be tolerated. As the pilot position is moved aft towards and then behind the center of rotation, pilot ratings are degraded. A multiloop analysis of pitch attitude and altitude control gave insight into this pilot position phenomenon. GRA

N83-16333# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.

LABORATORY SIMULATION TESTS AND INFRARED THERMOGRAPHY OF A-10 MAIN LANDING GEAR TIRES Final Report, Jul. 1980 - Dec. 1981

Robert K. Kiminecz Sep. 1982 94 p refs
(AD-A120272; ASD-TR-82-5019) Avail: NTIS HC A05/MF A01 CSCL 01/3

Infrared thermography was used to measure tire surface temperatures during aircraft taxi tests and laboratory tests. Since the A-10 operates with a toe-out alignment of the main gear, particular emphasis was placed on the determination of the effect of small slip angles on tire surface temperature distribution. Preliminary laboratory tests were conducted to obtain small slip

angle carpet plots while simultaneously measuring the tire surface temperature. The results of these tests showed that operating a tire with small positive slip angles resulted in consistently higher outboard (versus inboard) sidewall temperatures. The magnitude of the difference between sidewall surface temperatures (outboard minus inboard) appeared to be a linear function of small slip angles. The tires were then rolled to failure with a fixed one degree slip angle to determine the surface temperature distribution at or near tire failure. A laboratory test plan that simulated A-10 operations at Myrtle Beach AFB was written as a series of dynamics statements that were used to program a computer controlled tire test dynamometer. These tests dynamically simulated all loads, velocities, turns, stops and distances rolled by an A-10 main landing gear tire from the time the aircraft leaves the chocks until it is airborne and from the time it lands until it returns to the chocks. The simulation tests resulted in laboratory tire failures that were in agreement with field failure data for the smalll sample of tires that were tested. GRA

N83-16334# Performance Measurement Associates, Inc., Vienna, Va.
PERFORMANCE MEASURES FOR AIRCRAFT CARRIER LANDINGS AS A FUNCTION OF AIRCRAFT DYNAMICS Final Technical Report, 23 Sep. 1980 - 22 Jan. 1982
Edward M. Connelly Jan. 1982 86 p refs
(Contract N61339-80-C-0132)
(AD-A120473; PMA55-1-81; NAVTRAEQUIPC-80-C-0132-1) Avail: NTIS HC A05/MF A01 CSCL 01/2

A theory of performance measurement for operator controlled systems is presented. The theory permits synthesis of a system performance on successive data samples based on the impact of the sampled performance on the overall summary of performance. The dynamics of the controlled element, i.e., the aircraft, are effectively removed from the measurement even though the pilot (operator) continues to control the aircraft. This report documents the development of measures for aircraft carrier landings for the glide path and angle of attack control channels. In addition to the aircraft carrier landing problems, an application of system performance measures to air to ground weapons launch problems were analyzed. The weapon launch problem is characterized by the existence of a release hyper surface from which a high probability of kill can be expected. Thus, the problem is not characterized as having necessarily a single path which must be flown to a weapons release point, but rather, a confluence of paths exist which proceed to the release hyper surface. A method for developing a summary measure for the weapons release problem is presented along with an outline of the method of synthesizing the associated system performance measure. Finally, a comparison of the nature and applications of linear pilot models and system performance measures is developed. GRA

N83-16335# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Drehfluegler.
SURVEY OF ACTIVE AND PASSIVE MEANS TO REDUCE ROTORCRAFT VIBRATIONS
G. Reichert and H. Strehlow 1 Oct. 1981 24 p refs Presented at DGLR Symp. on Aeroelasticity, Nuernberg, West Germany, 5-7 Oct. 1981 Previously announced in IAA as A82-37946
(MBB-UD-350) Avail: Issuing Activity
For abstract see A82-37946.

N83-16336# Bristol Univ. (England). Dept. of Aeronautical Engineering.
HELICOPTER FIN EFFECTIVENESS B.S. Thesis
G. A. Johnson and C. M. Wu Jun. 1982 58 p refs
(BU-271) Avail: NTIS HC A04/MF A01

The nature of fin ineffectiveness in helicopters of WG30 type was explored. A one-fifth scale model of the early Westland Lynx helicopter was used, with suitable upsweep modifications to simulate the WG30. Wind tunnel tests were carried out to measure the yawing moments using the balance for cases of fin on and fin off, and wake surveys using yawmeters around the fin for various fuselage configurations and pitch-yaw combinations. Diagrams of flow angles and isodynamic contours were constructed and flow visualization tests were made. It is concluded that the loss of fin effectiveness is caused by wake shed from the upper fuselage rather than from the lower part. The loss increases with pitch incidence. The change in flow angles seen by the fin and dynamic pressure losses, which fell short of the free stream value by factors of 0 to 0.5, are both important. The values of yawing moment due to the fin from balance and from pressure measurements correlate well with each other. Author (ESA)

N83-16337# Bristol Univ. (England). Dept. of Aeronautical Engineering.
DESIGN CONSIDERATIONS FOR THE CONSTRUCTION OF A SHERIFF WING IN COMPOSITE MATERIALS B.S. Thesis
D. M. Powell and J. P. Weiss Jun. 1982 54 p refs
(BU-280) Avail: NTIS HC A04/MF A01

The state of the art of aircraft construction using composites is reviewed, and the design of a composite wing for the Sherriff twin engine light training aircraft is considered. The major problems associated with composites are: lack of knowledge of long term material properties; difficulty in joining the materials; methods of testing for cracks and internal failure, and the lack of a suitable choice of safety factors to apply to known strengths. Conventional aluminum alloy structures cannot be made in fiber composites merely by substitution of materials. The design must be reappraised, emphasizing loading specification, stiffness, safety factors, size, and material selection. Careful choice of filament orientation and lay-up must be made to ensure that the major loads are carried by the fibers, minimizing damaging effects of out of plane loads. Author (ESA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N83-16338*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RESULTS FROM TESTS, WITH VAN-MOUNTED SENSOR, OF MAGNETIC LEADER CABLE FOR AIRCRAFT GUIDANCE DURING ROLL-OUT AND TURNOFF
James C. Young, W. Thomas Bundick, and Stewart H. Irwin Jan. 1983 38 p refs
(NASA-TP-2092; L-15482; NAS 1.60:2092) Avail: NTIS HC A03/MF A01 CSCL 01/4

Tests were conducted with a van mounted experimental magnetic leader cable sensor to evaluate its potential for measuring aircraft displacement and heading with respect to the leader cable during roll out and turnoff. Test results show that the system may be usable in measuring displacement but the heading measurement contains errors introduced by distortion of the magnetic field by the metal van or aircraft. Author

N83-16339# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
THE ON-BOARD COMPUTER SYSTEM FOR THE F29 PROTOTYPE FLIGHT TEST
P. J. Manders 13 May 1981 45 p Presented at 4th Ann. Users Group Conf., San Diego, Calif., 22-25 Feb. 1981 and at the 4th AGARD Special Course on Flight Test Instrumentation Delft, Netherlands, May 1981
(NLR-MP-81034-U) Avail: NTIS HC A03/MF A01

The on board computer system of the Fokker F29 flight test instrumentation system is described. The central unit is a ROLM 1664 computer, with an interface unit to handle data word identification labeling, time tagging and selection. Visual display is available for system checkout and in flight quick look. Computer compatible tape is used for recording and post flight quick look. About 1800 parameters, at 10,000 samples/sec are recorded. In

spite of the advantages in real-time behavior, and in less software complexity, a multiple computer configuration (with completely separated presentation and recording processes) was not preferred, because of the cost and the extra effort in computer-to-computer data transfer. Author (ESA)

N83-16340# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
THE F29 FLIGHT TEST INSTRUMENTATION AND DATA PROCESSING SYSTEM. AN OVERVIEW OF REQUIREMENTS, DESIGN AND ORGANIZATION
R. Krijn 18 May 1981 36 p refs Presented at 4th AGARD Special Course on Flight Test Instrumentation, Delft, Netherlands, May 1981
(NLR-MP-81035-U) Avail: NTIS HC A03/MF A01

The process of designing a flight test instrumentation system is described and the F-29 system is presented. Technical and operational requirements are outlined and the organization of the development phase is discussed. Reasons for selecting given measurement systems, e.g., digital or analog, on board or ground based, are explained. Author (ESA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-16341*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
ENERGY EFFICIENT ENGINE: FAN TEST HARDWARE DETAILED DESIGN REPORT
T. J. Sullivan Oct. 1980 146 p refs
(Contract NAS3-20643)
(NASA-CR-165148; NAS 1.26:165148; R80-AEG-417) Avail: NTIS HC A07/MF A01 CSCL 21E

A single stage fan and quarter stage booster were designed for the energy efficient engine. The fan has an inlet radius ratio of 0.342 and a specific flow rate of 208.9 Kg/S sq m (42.8 lbm/sec sq ft). The fan rotor has 32 medium aspect ratio (2.597) titanium blades with a partspan shroud at 55% blade height. The design corrected fan tip speed is 411.5 M/S (1350 ft/sec). The quarter stage island splits the total fan flow with approximately 22% of the flow being supercharged by the quarter stage rotor. The fan bypass ratio is 6.8. The core flow total pressure ratio is 1.67 and the fan bypass pressure ratio is 1.65. The design details of the fan and booster blading, and the fan frame and static structure for the fan configuration are presented. S.L.

N83-16342*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
THE CF6 ENGINE PERFORMANCE IMPROVEMENT Summary Report
W. A. Fasching Oct. 1982 98 p refs
(Contract NAS3-20629)
(NASA-CR-165612; NAS 1.26:165612; R82AE511) Avail: NTIS HC A05/MF A01 CSCL 21E

As part of the NASA-sponsored Engine Component Improvement (ECI) Program, a feasibility analysis of performance improvement and retention concepts for the CF6-6 and CF6-50 engines was conducted and seven concepts were identified for development and ground testing: new fan, new front mount, high pressure turbine aerodynamic performance improvement, high pressure turbine roundness, high pressure turbine active clearance control, low pressure turbine active clearance control, and short core exhaust nozzle. The development work and ground testing are summarized, and the major test results and an enomic analysis for each concept are presented. Author

N83-16343*# Garrett Turbine Engine Co., Phoenix, Ariz.
A METHOD TO ESTIMATE WEIGHT AND DIMENSIONS OF SMALL AIRCRAFT PROPULSION GAS TURBINE ENGINES: USER'S GUIDE Final Report
P. L. Hale Aug. 1982 136 p refs
(Contract NAS3-23037)
(NASA-CR-168049; NAS 1.26:168049; Garrett-21-4270-1.1) Avail: NTIS HC A07/MF A01 CSCL 21E

The weight and major envelope dimensions of small aircraft propulsion gas turbine engines are estimated. The computerized method, called WATE-S (Weight Analysis of Turbine Engines-Small) is a derivative of the WATE-2 computer code. WATE-S determines the weight of each major component in the engine including compressors, burners, turbines, heat exchangers, nozzles, propellers, and accessories. A preliminary design approach is used where the stress levels, maximum pressures and temperatures, material properties, geometry, stage loading, hub/tip radius ratio, and mechanical overspeed are used to determine the component weights and dimensions. The accuracy of the method is generally better than + or - 10 percent as verified by analysis of four small aircraft propulsion gas turbine engines. S.L.

N83-16344# Naval Postgraduate School, Monterey, Calif.
PRELIMINARY MEASUREMENTS AND CODE CALCULATIONS OF FLOW THROUGH A CASCADE OF DCA BLADING AT A SOLIDITY OF 1.67 M.S. Thesis
William D. Molloy, Jr. Jun. 1982 281 p refs
(AD-A120456) Avail: NTIS HC A13/MF A01 CSCL 21/5

An experimental program to obtain uniform inlet flow to the test blading in a large cascade facility designed to use inlet turning vanes, and to measure the conventional blade element performance, is described. Attempts to reduce non-uniformities (+ or - 1% in velocity) using screens were unsuccessful and so abandoned. Preliminary Double Circular Arc(DCA) blade element performance data were obtained without screens at one incidence angle before aero-mechanical problems with the inlet guide vane assembly curtailed testing. The blade surface pressure distribution at the one test condition compared very favorably with the distribution predicted using the NASA computer code QSONIC. Recommendations were made that would avoid the aero-mechanical problems encountered. GRA

N83-16345# Dayton Univ., Ohio. Research Inst.
ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF TURBINE BLADE DAMPING Final Report, 30 Jun. 1981 - 29 Jun. 1982
Robert J. Dominic, Philip A. Graf, and B. Basava Raju Aug. 1982 57 p refs
(Contract F49620-81-K-0014; AF Proj. 2307)
(AD-A120470; UDR-TR-82-39; AFOSR-82-0911TR) Avail: NTIS HC A04/MF A01 CSCL 21/5

Simulated blade to disk damping of a model turbine blade was evaluated, both experimentally and analytically. Experimental work was performed with a unique apparatus that introduced friction damping at the blade platform. Analytical work was performed with a computer program based on the lumped mass theoretical analysis developed by Muszynska and Jones. A test was performed also to evaluate the coefficient of friction at the test setup conditions. Experimental and analytical studies showed good qualitative agreement. Very high damping was achieved by means of friction. Blade response to forced vibration was reduced by two orders of magnitude over the frequency range of the first two bending modes of the blade at the optimum friction damping conditions. For the tested blade configuration, optimum damping occurred when the friction force (Micro N) was equal to or slightly greater than the excitation force. GRA

N83-16346# Neilsen Engineering and Research, Inc., Mountain View, Calif.
BLADE EROSION EFFECTS ON AIRCRAFT-ENGINE COMPRES-

SOR PERFORMANCE Final Report, 1 Sep. 1979 - 31 Mar. 1982
R. G. Schwind and O. J. McMillan Sep. 1982 56 p refs
(Contract DE-AC03-79CS-50095)
(DE82-021791; DOE/CS-50095/T2; NEAR-TR-274) Avail: NTIS HC A04/MF A01

Results are presented from a research program intended to allow prediction of changes in JT8D compressor performance due to blade shape changes caused by erosion. A review of pertinent literature is included in which the mechanisms responsible for turbine engine performance deterioration are discussed. Profile measurements of new blades for the JT8D-7 engine are given, and the level of variability among different samples of new blades established. To allow assessment of the areas in the compressor where blade shape changes due to erosion are important in comparison to this new blade variability, measurements of corresponding sections of used blades were also made. The change in blade element performance associated with a particular shape change for one of these blade sections is calculated; the major effect predicted is a considerable loss of turning by the blade element. The means by which these results can be used to calculate changes in overall compressor performance are indicated. DOE

N83-16347# Limbach-Motorenbau, Koenigswinter (West Germany).
VIBRATION-FREE INTERNAL COMBUSTION ENGINE FOR GENERAL AVIATION Final Report, Nov. 1981
Peter Limbach, Jr. Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 58 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-82-016; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11,50

A working engine model was designed and built in order to demonstrate that engines based on the Huf principle are possible. Function, certain design features, and results of vibration measurements on the first Huf-engine built, the HL 2000, are outlined. During test runs reduction of the vibration level of up to 70% was observed, as compared to conventional piston engines. Without complicated technologies it is possible to build functional aircraft and other engines according to the Huf-principle, with excellent chances on the market. Author (ESA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N83-16348*# Calspan Advanced Technology Center, Buffalo, N.Y.
CONTROL CONCEPTS FOR THE ALLEVIATION OF WIND-SHEARS AND GUSTS
E. G. Rynaski and K. S. Govindaraj Jul. 1982 181 p refs
(Contract NAS1-16691)
(NASA-CR-166022; NAS 1.26:166022; Rept-6896-F-1) Avail: NTIS HC A09/MF 01 CSCL 01C

Automatic control system design methods for gust and shear alleviation were studied. It is shown that automatic gust/shear alleviation systems can be quite effective if both throttle and elevator are used in harmony to produce the forces and moments required to counter the effects of the windshear. Regulation with respect to ground speed or airspeed results in very similar system designs. The application of the NASA total energy probe in the detection of windshear and criteria for alleviation is considered. The theory and application of robust output observers is extended. Design examples show how implementation of the control laws can be accomplished using observers, and thereby resulting in less complex control system configurations. Author

N83-16349*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DYNAMIC STRUCTURAL AEROELASTIC STABILITY TESTING OF THE XV-15 TILT ROTOR RESEARCH AIRCRAFT
Laurel G. Schroers Dec. 1982 21 p refs Prepared in cooperation with Army Aviation Research and Development Command, Moffett Field, Calif.
(NASA-TM-84293; A-9081; NAS 1.15:84293; USAAVRADCOM-82-A-17) Avail: NTIS HC A02/MF A01 CSCL 01C

For the past 20 years, a significant effort has been made to understand and predict the structural aeroelastic stability characteristics of the tilt rotor concept. Beginning with the rotor-pylon oscillation of the XV-3 aircraft, the problem was identified and then subjected to a series of theoretical studies, plus model and full-scale wind tunnel tests. From this data base, methods were developed to predict the structural aeroelastic stability characteristics of the XV-15 Tilt Rotor Research Aircraft. The predicted aeroelastic characteristics are examined in light of the major parameters effecting rotor-pylon-wing stability. Flight test techniques used to obtain XV-15 aeroelastic stability are described. Flight test results are summarized and compared to the predicted values. Wind tunnel results are compared to flight test results and correlated with predicted values. A.R.H.

N83-16350*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE APPLICATION OF PARAMETER ESTIMATION TO FLIGHT MEASUREMENTS TO OBTAIN LATERAL-DIRECTIONAL STABILITY DERIVATIVES OF AN AUGMENTED JET-FLAP STOL AIRPLANE
Jack D. Stephenson Jan. 1983 62 p refs
(NASA-TP-2033; A-8977; NAS 1.60:2033) Avail: NTIS HC A04/MF A01 CSCL 01C

Flight experiments with an augmented jet flap STOL aircraft provided data from which the lateral directional stability and control derivatives were calculated by applying a linear regression parameter estimation procedure. The tests, which were conducted with the jet flaps set at a 65 deg deflection, covered a large range of angles of attack and engine power settings. The effect of changing the angle of the jet thrust vector was also investigated. Test results are compared with stability derivatives that had been predicted. The roll damping derived from the tests was significantly larger than had been predicted, whereas the other derivatives were generally in agreement with the predictions. Results obtained using a maximum likelihood estimation procedure are compared with those from the linear regression solutions. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N83-16351*# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
A WAKE TRAVERSE TECHNIQUE FOR USE IN A 2 DIMENSIONAL TRANSONIC FLEXIBLE WALLED TEST SECTION
S. W. D. Wolf Sep. 1982 13 p refs
(Grant NsG-7172)
(NASA-CR-165995; NAS 1.26:165995; AASU-Memo-82/3) Avail: NTIS HC A02/MF A01 CSCL 14B

Reported two dimensional validation data from the Transonic Self-Streamlining Wind Tunnel (TSWT) concerns model lift. The models tested provided data on their pressure distributions. This information was numerically integrated over the model surface to determine lift, pressure drag and pitching moment. However, the

pressure drag is only a small component of the total drag at nominal angles of attack and cannot be used to assess the quality of flow simulation. An intrusive technique for obtaining information on the total drag of a model in TSWT is described. The technique adopted is the wake traverse method. The associated tunnel hardware and control and data reduction software are outlined and some experimental results are presented for discussion.
Author

N83-16352# Federal Aviation Administration, Washington, D.C. Office of Airport Standards.
MAINTENANCE OF AIRPORT VISUAL AID FACILITIES: ADVISORY CIRCULAR
26 Aug. 1982 113 p
(AC-150-5340-26) Avail: NTIS HC A06/MF A01

Recommended guidelines for maintenance of airport visual aid facilities are provided. Suggestions on establishing a preventive maintenance program are provided. Maintenance topics of a more general nature are addressed. Author

N83-16353# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
EVALUATION OF WIND-DRIVEN RETROREFLECTIVE TAXIWAY EDGE MARKERS Final Report, Apr. - Aug. 1982
Guy S. Brown Dec. 1982 17 p
(FAA Proj. 081-502-580)
(DOT/FAA/RD-82/80; DOT/FAA-CT-82/131) Avail: NTIS HC 02/MF A01

An innovative taxiway edge retroreflective market, designed to rotate when there is sufficient wind, was evaluated to determine whether the markers would provide adequate visual guidance at night while rotating and when stationary, and whether innovative rotating feature adds to or detracts from the guidance value. The markers consist of a plastic can or cylinder, 6 1/4 inches by 8 inches tall, mounted on plastic polyvinyl chloride pipe. Wind collector vanes on the cylinder are used to rotate the cylinder when winds are above approximately 8 knots. Light is reflected at night from retroreflective bands of yellow and blue material and from glass beads imbedded in the painted material. The retroreflective bands of material are staggered vertically producing motion or movement both when rotating horizontally and vertically. The test results concluded that the wind driven edge markers adequately define the taxiway and provided adequate visual guidance for taxiing while the markers were stationary and when rotating during daylight hours and at night. S.L.

N83-16354# California Univ., Livermore. Lawrence Livermore Lab.
CONCEPTUAL DESIGN OF A TECHNOLOGY DEVELOPMENT FACILITY (TDF)
J. N. Doggett and C. C. Damm 1981 6 p refs Presented at 9th Symp. on Engr. Problems of Fusion Res., Chicago, 26-29 Oct. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE82-001589; UCRL-85999; CONF-811040-41) Avail: NTIS HC A02/MF A01

A concept for employing a single cell mirror machine in a facility for testing and developing fusion reactor materials, components, and subsystems in a fusion reactor environment was developed. The approach is similar to that of the FERF study, except that an auxiliary thermal barrier cell was added at each end of the yin-yang magnet. In this way, plasma microstability was provided by confining a warm plasma component between potential peaks at each end of the device (just as in the tandem mirror with auxiliary barrier cells) while confinement was improved by the inherent reduction in ambipolar potential drop in the central cell. DOE

N83-16355# Naval Postgraduate School, Monterey, Calif.
EVALUATION OF HELICOPTER PILOT'S ATTITUDE CONTROL USING A SIMULATED HEAD-UP DISPLAY IN A SIMULATED HELICOPTER COCKPIT M.S. Thesis
Michael C. Stichter Jun. 1982 58 p refs
(AD-A119570) Avail: NTIS HC A04/MF A01 CSCL 05/9

As demands on the aviator's aeronautical, technical, and tactical skills increase, so must the employment of advanced cockpit design concepts. Advanced systems make for a reduced crew workload and a safer, more proficient mission capable aircraft. Six designated helicopter pilots (Navy, Marine Corps and Army) were evaluated on their ability to fly a simulated instrument flight regime using only a head-up display as an attitude reference. Flight and control simulation was obtained through the construction of a generic helicopter cockpit, with dynamic gage indications generated by an analog computer. Two head-up display flights were flown with the display in the 12 o'clock and 2 o'clock positions. Their results were compared to an initial flight using cockpit instrumentation only. All three flights were identical profiles. Pilot performance was recorded graphically with strip charts and reduced into three performance zones. By averaging the percentage of time each pilot was in zone one, over each individual flight, it was shown that the average pilot's performance using the head-up display was within four to seven percentage points of their performance using only cockpit instrumentation. Author (GRA)

N83-16356# Canyon Research Group, Inc., Westlake Village, Calif.
APPLICATIONS OF SIMULATOR FREEZE TO CARRIER GLIDESLOPE TRACKING INSTRUCTION Final Report, 1 May 1980 - 31 Aug. 1981
R. G. Hughes (AF Human Resources Lab.), G. Lintern, D. C. Wightman (Naval Training Equipment Center), R. B. Brooks (AF Human Resources Lab.), and J. Singleton (US Navy) Orlando, Fla. Naval Training Equipment Center Jul. 1982 58 p refs
(Contract N61339-78-C-0060; AF Proj. 1123)
(AD-A118862; TR-81-023; NAVTRAEQUIPC-78-C-0060-9; AFHRL-TR-82-3) Avail: NTIS HC A04/MF A01 CSCL 05/9

Twenty-five experienced F-4 and F-16 Air Force pilots were instructed in carrier landings in the Visual Technology Research Simulator (VTRS). The training was conducted under three instructional conditions, two of which employed the simulator's 'freeze' feature. Additionally, two methods of defining errors for carrier glideslope tracking were examined. These experimental training techniques were compared to a conventional training approach where no 'freezes' were imposed during the training sequence. While pilots who were trained under the 'freeze' condition developed control strategies that distinguished them from pilots trained by Conventional measures, no differences were found between these groups on rate of extent of learning. In response to a post experimental questionnaire, pilots who were trained under 'freeze' conditions indicated that the simulator 'freeze' was frustrating and added to the overall difficulty of the task. These pilots further reported being more motivated to avoid the 'freeze' than to perform the task correctly during training. A probe technique was used to examine differential transfer in lieu of the more traditional transfer-of-training technique. Although this experimental use of the probe technique was a preliminary effort, it does appear to hold promise for transfer-of-training experiments of this type.
Author (GRA)

N83-16357# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
SETUP FOR FAST AUTOMATIC ADAPTATION OF FLEXIBLE WIND CHANNEL WALLS [EINE EINRICHTUNG ZUR SCHNELLEN AUTOMATISCHEN ADAPTION VON FLEXIBLEN WINDKANALWAENDEN]
Juergen Barg 1982 111 p refs In GERMAN
(ILR-53; ISBN-3-7983-0832-2; ISSN-0341-0587) Avail: NTIS HC A06/MF A01

Methods to determine the wall contour of two dimensional adaptive wind channels were developed. An analogical wall adjusting system is proposed. A microprocessor controlled system is proposed for three dimensional wind channels. Problems related to measurements in two dimensional channels are discussed and an adaptation criterion enabling an automatic exploitation is defined. Author (ESA)

N83-16358# Operations Research, Inc., Silver Spring, Md.
AIRPORT COMMUNITY SOUNDPROOFING AND RELOCATION STUDY Final Report
Richard Chais, Larry Ronk, John Kirkland, and James Selwood Washington EPA Jul. 1982 192 p refs
(Contract EPA-68-01-6154)
(PB82-259144; EPA-550/9-82-343) Avail: NTIS HC A09/MF A01 CSCL 01E

For many airports, a residual population imported by aircraft noise will remain after benefits from all other noise control means have been realized. This report considers residential soundproofing and relocation programs as a means of achieving airport noise/land use compatibility. A detailed discussion of issues involved in such a program is given. To quantify the cost of such a program a methodology is developed and used to integrate parameters affecting noise exposure. A forecast is presented of changes in air carrier airport noise exposure that will occur during the balance of this century. The study also examines the noise exposure benefit of noise abatement flight operations, flight procedure, and restrictions on population encroachment. Soundproofing and relocation costs are developed for four airports. GRA

N83-16359# Environmental Protection Agency, Washington, D.C. Office of Noise Abatement and Control.
AIRPORT NOISE: LAND-USE COMPATIBILITY BY THE YEAR 2000
Robert J. Koenig and John Tyler Aug. 1982 98 p refs
(PB82-259151; EPA-550/9-82-344) Avail: NTIS HC A05/MF A01 CSCL 01E

This report reviews the progress which has been made in airport noise control and presents a forecast of changes in aviation noise exposure that will occur during the balance of this century. Results are given of an analysis which examines the benefits of noise abatement flight operations, flight procedures and of restrictions on population encroachment, on residential noise exposure. Cost of residential soundproofing and relocation, based upon in-depth studies, are presented for four air carrier airports which represent four airport categories. While the main focus of the report is on noise exposure above Ldn 65 at air carrier airports, noise exposure around general aviation and joint-use civil/military airports is also discussed. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N83-16360# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE, NO. 18
4 Nov. 1982 153 p refs Transl. into ENGLISH of various Russian articles
(JPRS-82169) Avail: NTIS HC A08

Several areas of space science and technology are addressed including manned space missions, interplanetary science, exobiology, space applications, and space policy. For individual titles, see N83-16361 through N83-16368.

N83-16361# Joint Publications Research Service, Arlington, Va.
SEVENTY-FIVE DAY MISSION ON SALYUT-6
S. D. Grishin and A. D. Yegorov *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 22-28 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 1, Jan. - Feb. 1982 p 2-7 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

The accomplishments of the fifth major mission to the Salyut-6 space station are discussed. Results of space processing and holography experiments are described along with associated instrumentation. The findings from biomedical monitoring and experimentation are discussed in some detail. Investigations in cosmic rays and remote sensing are also addressed. M.G.

N83-16362# Joint Publications Research Service, Arlington, Va.
PAST AND PRESENT OF COSMONAUT TRAINING CENTER **c53**
In its USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 29-34 Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 4, Apr. 1982 p 40-43 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08/MF A01

A historical overview of the development of the Soviet cosmonaut training center is presented and the facilities of the present complex are briefly described. M.G.

N83-16363# Joint Publications Research Service, Arlington, Va.
COSMOS SERIES SATELLITE **c15**
B. A. Pokrovskiy *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 35-43 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 1, Jan. - Feb. 1982 p 22-26 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

The research objectives of the Cosmos series satellites are described including missions for atmospheric and cosmic ray studies, astronomy, and biomedical experiments. Ground station requirements, launching, mission adapted configurations, and onboard equipment are also addressed. M.G.

N83-16364# Joint Publications Research Service, Arlington, Va.
SURFACE OF VENUS **c91**
L. V. Ksanfomaliti *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 59-64 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 1, Jan. - Feb. 1982 p 16-19 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

The topographic features of Venus are discussed with reference to the features of the Earth's surface. Hypotheses to explain the Venusian lithosphere are outlined. M.G.

N83-16365# Joint Publications Research Service, Arlington, Va.
SIGMA-2 CHROMATOGRAPH DATA ON VENUS'S ATMOSPHERE **c91**
L. Mukhin and V. Gelman *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 65-67 Transl. into ENGLISH from Pravda (Moscow), 4 Jun. 1982 p 2 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

The Sigma-2 chromatograph system installed in the Venera-12 and Venera-14 satellites is briefly described. The chemical compounds indicated by the analysis of the chromatographs are listed. M.G.

N83-16366# Joint Publications Research Service, Arlington, Va.
EXCHANGE OF HOLOGRAPHIC INFORMATION BETWEEN SALYUT-6 SPACE STATION AND FLIGHT CONTROL CENTER **c35**
Zh. Gurragcha, S. B. Gurevich, V. A. Dzhanibekov, B. Ye. Kashonov, V. V. Kovalenok, V. B. Konstantinov, M. Kordero, S. Mesa, A. V. Militsin, R. Oms et al *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 76-86 refs Transl. into ENGLISH from Tekhn. Kino i Televideniya (Moscow), no. 2, Feb. 1982 p 5-11 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

Experiments in the transmission of holographic information between space and ground are described. The results revealed the nature of the losses of spatial and gradational information about the transmitted object that arise during exchange of holographic information over Earth-space television links. Only comparatively low frequency information (such as an object displacement interferogram) can be tramsmitted without losses. M.G.

N83-16367# Joint Publications Research Service, Arlington, Va.
ASPECTS OF WORK ON FLIGHT CONTROL OF SPACE VEHICLES **c18**
In its USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982

p 87-92 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 2, Mar. - Apr. 1982 p 36-40 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

The activities of personnel in the ground control center during manned and unmanned space missions are described. M.G.

N83-16368# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF SATELLITE PARAMETERS c13
V. Andreyev *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 93-97 Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 5, May 1982 p 44-45 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

The computational and instrumentational aspects of techniques for the determination artificial satellite orbital parameters are addressed. M.G.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N83-16369# Royal Aircraft Establishment, Farnborough (England).
THE VALUE OF PHOTOGRAPHIC OBSERVATIONS IN IMPROVING THE ACCURACY OF SATELLITE ORBITS
D. G. King-Hele Feb. 1982 20 p refs Previously announced in IAA as A82-38418
(RAE-TR-82013; RAE-Space-612; BR83421) Avail: NTIS HC A02/MF A01

Orbit determinations normally rely on radar and visual observations. Camera observations are shown to improve orbital accuracy considerably. Observations from the Russian AFU-75 cameras onboard the balloon-satellite Explorer 19 together with observations from the Hewitt camera at Edinburgh were used to improve three orbits of the Explorer 19 Satellite in October 1972. The camera observations improve the accuracy of the orbital elements by a factor of up to 11, while other orbital elements benefit much less. The reasons for the differences are identified, the most important being the number of camera plates and the spread of the stations in latitude. As a by-product of the work, the cross-track residuals of 12 visual observers were evaluated. Their mean was 0.02 deg. Author (ESA)

N83-16368# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF SATELLITE PARAMETERS
V. Andreyev *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 93-97 Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 5, May 1982 p 44-45 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N83-16370* National Aeronautics and Space Administration, Washington, D. C.
NASA TO LAUNCH COOPERATIVE INTERNATIONAL SATELLITE
12 Jan. 1983 35 p
(NASA-News-Release-83-1; P83-10001) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 22B

Launch plans for the International Infrared Astronomical Satellite (IRAS) are provided. Author

N83-16371*# National Aeronautics and Space Administration, Washington, D. C.
MISSION OPERATION REPORT (MOR) TRACKING AND DATA RELAY SATELLITE (TDRS-A) MISSION
14 Jan. 1983 95 p
(NASA-TM-85195; MOR-T-313-83-01; NAS 1.15:85195) Avail: NTIS HC A05/MF A01 CSCL 22B

The TDRS-A mission is the first of three missions required to establish the initial configuration of the tracking and data relay satellite system. The mission objectives, the mission sequence involving that portion of the STS-6 mission which is relevant to the TDRS/IUS mission, and the TDRS/IUS mission until separation in geosynchronous mission are discussed. The TDRS spacecraft, the IUS, the White Sands ground terminal, user services, the GSFC network control center and associated GSFC support elements are described. A.R.H.

N83-16372# RAND Corp., Santa Monica, Calif.
PROSPECTIVE RESEARCH AND DEVELOPMENT AREAS FOR US CRUISE AND BALLISTIC MISSILE GUIDANCE UPDATING SYSTEMS
Edmund H. Conrow Jan. 1982 29 p
(AD-A119870; AD-E750678; RAND/P-6725) Avail: NTIS HC A03/MF A01 CSCL 17/7

Given the need for high accuracy strategic missiles, it is reasonable to ask what potential operational payoffs may exist for improving these systems (and developing others), and where should Research and Development (R&D) funding be channeled to permit Preplanned Product Improvement (P3I) or the introduction of advanced systems. The purpose of this paper is to discuss potential R&D funding areas which can improve the effectiveness of map-matching guidance updating systems. As such, it represents an initial attempt in this field to examine the components of these systems, and to provide estimates of their potential payoff, technical risk, and required funding levels. GRA

N83-16373# European Space Agency, Paris (France).
MARECS DATA BOOK
H. B. F. Agterhuis, comp. Jan. 1982 167 p
Avail: NTIS HC A08/MF A01

The MARECS communication system, satellite configuration, platform subsystems and launch configuration are described. The test philosophy, monitoring facilities, operations, and in orbit test plan are outlined. Author (ESA)

N83-16374# European Space Agency, Paris (France).
EUROPE'S PLACE IN SPACE
Jan. 1982 48 p Original contains color illustrations
Avail: NTIS HC A03/MF A01

The ESA administrative structure is outlined, and the COS B, Geos, ISEE, Exosat, Hipparcos, Giotto, ISPM, and Space Telescope programs are described. The Meteosat, Sirio, LANDSAT, OTS, ECS, Marecs, L-Sat, Spacelab and Ariane programs are summarized. Author (ESA)

N83-16375# Engins Matra, Velizy (France).
GUIDANCE-PILOTING SIMULATOR: DEFINITION AND OUTLINE OF MISSILE GUIDANCE AND PILOTING FUNCTIONS [SIMULATEUR DE GUIDAGE - PILOTAGE. DEFINITION ET MISE EN EVIDENCE DES FONCTIONS DE GUIDAGE ET PILOTAGE DES MISSILES]
Philippe dePellegars and Pierre deChazelles 1981 196 p refs In FRENCH
(VAU/81/100) Avail: NTIS HC A09/MF A01

The visualization of any given entry to the transfer function of the piloting of a missile is discussed, and a numerical simulator system is outlined. The simulator consists of an analog computer which enables given phenomena to be highlighted, a curve visualization system with recopy facility, a slide projector, and a general synopsis of the guidance and piloting links, the whole is controlled by microprocessors. Numerical simulation starts by establishing the equations of state, followed by systems integration. Author (ESA)

N83-16363# Joint Publications Research Service, Arlington, Va.
COSMOS SERIES SATELLITE
B. A. Pokrovskiy *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 35-43 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 1, Jan. - Feb. 1982 p 22-26 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N83-16376# Committee on Science and Technology (U. S. House).
THE NEED FOR AN INCREASED SPACE SHUTTLE ORBITER FLEET
Washington GPO 1982 30 p Rept. presented by the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol., 97th Congr., 2nd Sess., Dec. 1982
(GPO-12-971) Avail: Subcommittee on Space Science and Applications

The need for additional orbiters for the Space Transportation fleet is addressed. Author

N83-16377*# Axiomatix, Los Angeles, Calif.
THE PAYLOAD/SHUTTLE-DATA-COMMUNICATION-LINK HANDBOOK Final Report
30 Aug. 1982 405 p refs
(Contract NAS9-16067)
(NASA-CR-167786; NAS 1.26:167786; R8208-3) Avail: NTIS HC A18/MF A01 CSCL 22B

Communication links between the Orbiter, payloads, and ground are described: end-to-end, hardline, S-band, Ku-band, TDRSS relay, waveforms, premodulation, subcarrier modulation, carrier modulation, transmitter power, antennas, the RF channel, system noise, received signal-to-noise spectral density, carrier-tracking loop, carrier demodulation, subcarrier demodulation, digital data detection, digital data decoding, and tandem link considerations. N.W.

N83-16378*# National Aeronautics and Space Administration, Washington, D. C.
SPACELAB 1
[1982] 33 p Original contains color illustrations
(NASA-TM-85197; NAS 1.15:85197; S/N-033-000-00846-5; OCLC-08756576) Avail: GPO $4.00 CSCL 22B

Spacelab is a versatile modular facility installed in the space shuttle orbiter and exposed to space when the cargo bay doors are opened. It consists of an enclosed pressurized laboratory containing utilities, computer, work benches, and instrument racks for the conduct of experiments, as well as outside platforms (pallets) where such equipment as telescopes, antennas, and sensors are mounted for direct exposure to space. These units may be used in various combinations, returned to Earth, and reused on other flights. Spacelab can be outfitted with several tons of laboratory instruments for studies in astronomy, physics, chemistry, biology, medicine, and engineering. Author

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N83-16379# Sandia Labs., Albuquerque, N. Mex.
AUTOMATIC ADDRESSING OF TELEMETRY CHANNELS
L. A. Lucero Aug. 1982 34 p refs
(Contract DE-AC04-76DP-00789)
(DE82-021101; SAND-82-8001) Avail: NTIS HC A03/MF A01

To simplify telemetry software development, a design that eliminates the use of software instructions to address telemetry channels is being implemented in telemetry systems. By using the direct memory access function of the RCA 1802 microprocessor, once initialized, addressing of telemetry channels is automatic, requiring no software. The automatic addressing of telemetry channels (AATC) scheme is compared with an earlier technique that uses software. In comparison, the automatic addressing scheme effectively increases the software capability of the microprocessor, simplifies telemetry dataset encoding, eases dataset changes, and may decrease the electronic hardware count. The software addressing technique uses at least three instructions to address each channel. The automatic addressing technique requires no software instructions. Instead, addressing is performed using a direct memory access cycle stealing technique. A number of prototypes were built and tested in a full telemetry lab unit. DOE

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-16380# California Univ., Los Angeles. Dept. of System Science.
APPROXIMATION OF THE OPTIMAL COMPENSATOR FOR A LARGE SPACE STRUCTURE Interim Report, 30 Jun. 1981 - 1 Jul. 1982
Michael K. Mackay 1982 24 p refs Presented at the Workshop on Applications of Distributed System Theory to the Control of Large Space Structures, Pasadena, Calif., 14-16 Jul. 1982
(Grant AF-AFOSR-3550-78; AF Proj. 2304)
(AD-A120246; AFOSR-82-0849TR) Avail: NTIS HC A02/MF A01 CSCL 09/3

This paper considers the approximation of the optimal compensator for a large Space Structure. The compensator is based upon a solution to the Linear Stochastic Quadratic Regulator problem. Colocation of sensors and actuators is assumed. A small gain analytical solution for the optimal compensator is obtained for a single input/single output system, i.e., certain terms in the compensator can be neglected for sufficiently small gain. The compensator is calculated in terms of the kernal to a Volterra integral operator using a Neumann series. The calculation of the compensator is based upon the C sub o semigroup for the infinite

dimensional system. A finite dimensional approximation of the compensator is, therefore, obtained through analysis of the infinite dimensional compensator which is a compact operator.
Author (GRA)

N83-16381# European Space Agency, Paris (France).
OTS: FOURTH YEAR IN ORBIT Progress Report
Aug. 1982 76 p
Avail: NTIS HC A05/MF A01

The OTS orbital test program status and satellite utilization for European television transmission are described. The repeater, antenna, attitude control, power, and thermal control subsystems are discussed. The satellite continues to function well, both as a laboratory in its own right and as a means for payload exploitation.
Author (ESA)

N83-17370*# Eastern Connecticut State College, Willimantic. Dept. of Mathematical Sciences.
FUEL OPTIMAL MANEUVERS OF SPACECRAFT ABOUT A CIRCULAR ORBIT
Thomas E. Carter *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 22 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 22B

N83-17376*# Tulsa Univ., Okla. Dept. of Electrical Engineering.
SHAPE CONTROL OF LARGE SPACE STRUCTURES
Martin T. Hagan *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 28 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 22B

N83-16367# Joint Publications Research Service, Arlington, Va.
ASPECTS OF WORK ON FLIGHT CONTROL OF SPACE VEHICLES
In its USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 87-92 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 2, Mar. - Apr. 1982 p 36-40 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-16382*# Rocketdyne, Canoga Park, Calif.
COMPOSITE MATERIAL APPLICATION FOR LIQUID ROCKET ENGINES Final Report
S. W. Heubner Dec. 1982 145 p refs
(Contract NAS8-34509)
(NASA-CR-170707; NAS 1.26:170707; RI/RD82-289) Avail: NTIS HC A07/MF A01 CSCL 21H

With increasing emphasis on improving engine thrust-to-weight ratios to provide improved payload capabilities, weight reductions achievable by the use of composites have become attractive. Of primary significance is the weight reduction offered by composites, although high temperature properties and cost reduction were also considered. The potential for application of composites to components of Earth-to-orbit hydrocarbon engines and orbit-to-orbit LOX/H2 engines was assessed. The components most likely to benefit from the application of composites were identified, as were the critical technology areas where developed would be required. Recommendations were made and a program outlined for the design, fabrication, and demonstration of specific engine components.
S.L.

N83-16383# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PLASMA ENGINES
Sung Yuyang 8 Sep. 1982 11 p Transl. into ENGLISH from Hangkong Zhishi (China), Mar. 1982 p 12-13
(AD-A119845; FTD-ID(RS)T-0636-82) Avail: NTIS HC A02/MF A01 CSCL 20/9

The plasma engine is composed of two electrodes (a positive and a negative electrode) and a passage enclosed by the electrodes and two insulated side walls. This passage is perpendicular to the electric field with intensity E and at the same time passes through a magnetic field with inductance beta created by the magnet. The plasma is formed in the plasma generator, and is then allowed to pass through the accelerator. Since it is a charged gas, a current is produced from the positive electrode through the plasma to the negative electrode. Under the combined action of the electric field and the magnetic field, the plasma accelerates toward the exit of the accelerator, producing an ampere force.
GRA

N83-16384# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A STUDY OF THE ELECTRIC ROCKET (ION ENGINE)
Wang Nanhao 31 Aug. 1982 40 p Transl. into ENGLISH of Chinese document p 1-16 In CHINESE and ENGLISH
(AD-A120594; FTD-ID(RS)T-1101-82) Avail: NTIS HC A03/MF A01 CSCL 21/3

The electric rocket (ion engine) is defined. The use of the engine is analyzed, and design calculations are presented. The research and testing of the ion source are discussed.
S.L.

N83-16385# Research Inst. of National Defence, Stockholm (Sweden).
RESEARCH INSTITUTE OF NATIONAL DEFENCE'S MEASURE COMPUTER SYSTEM: EVALUATION PROGRAM FOR ROCKET ENGINE TESTS [FOA INSTITUTION 27 MAETDATORSYSTEM UTVAERDERINGSPROGRAM FOER RAKETMOTORPROV]
Soeren Hasselrot Feb. 1982 56 p refs In SWEDISH
(FOA-C-20444-D3) Avail: NTIS HC A04/MF A01

The physical background of a rocket engine test program, including the definition of different time intervals, is outlined and the principal methods allowing the automatization process to be carried out, e.g., interval selection, and the connection of the list of variables to the evaluation file, are reported. Program structure, routines, starting procedure, and data storage are reviewed.
Author (ESA)

N83-16386# Research Inst. of National Defence, Stockholm (Sweden).
A LIMITED STUDY OF THRUST VECTOR CONTROL WITH GUIDE VANES AND JET RUDDER [EN BEGRAENSAD STUDIE KRING TVC MED JETAVATOR OCH STRAALRODER]
Ralf Eliasson Apr. 1982 32 p refs In SWEDISH
(FOA-C-20455-E3) Avail: NTIS HC A03/MF A01

Thrust vector control for the control of jet propelled remote controlled vehicles was studied in test stands on a liquid propellant rocket engine. With guide vanes the impulse loss is 9 to 10 %; the impulse direction does not go through the rotation center of the guide vane. The impulse loss of the jet rudders is 7 to 8 %; tungsten rudders show the best heat resistance.
Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N83-16387# Rutgers Univ., New Brunswick, N. J. Dept. of Mathematics.
STATISTICAL MECHANICS FOR CALCULATION OF THERMAL MAGNETIC ELECTRICAL AND MECHANICAL PROPERTIES OF MATERIALS Final Scientific Report, 1 Oct. 1977 - 31 Sep. 1981
Joel L. Lebowitz 31 Sep. 1981 12 p refs
(Grant AF-AFOSR-3522-78)
(AD-A120215;) Avail: NTIS HC A02/MF A01 CSCL 12/1

Our work during the period covered by this report was devoted to the properties of materials using methods of statistical mechanics. The main focus of our research was in the following areas: (1) Kinetics of quenched alloys; (2) Phase diagrams of alloys; (3) Equilibrium and kinetic properties of polymers; (4) Properties of simple fluids and electrolytes. Our work involved both theoretical studies and computer simulations of model systems. These simulations, which were among the largest of their kind, greatly contributed to our understanding of the microscopic processes involved in various macroscopic phenomena. GRA

N83-16388# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
APPLICATION OF MOLECULAR SUBSTITUENT PARAMETERS FOR THE SPECIATION OF TRACE ORGANOMETALS IN ENERGY RELATED PROCESS FLUIDS BY ELEMENT SELECTIVE HPLC
C. S. Weiss, K. L. Jewett, F. E. Brinckman, and R. H. Fish Nov. 1981 15 p refs Presented at the DOE/NBS Workshop on Environ. Speciation and Monitoring Needs for Trace Metal-Containing Substances from Energy Related Processes, Gaithersburg, Md., 18-20 May 1981 Submitted for publication Prepared in cooperation with NBS, Washington, D.C.
(Contract W-7405-eng-48)
(DE82-003331; LBL-13308; CONF-810588-5) Avail: NTIS HC A02/MF A01

High performance liquid chromatographic separations coupled with element selective detectors provide trace molecular speciation methods applicable to energy related process fluids and associated waste leachates. These materials present a challenge because they contain complex matrices whose chemistries are not well understood, and the processes have the potential to generate compounds containing toxic metals and metalloids that are either unexpected or have not been previously identified. Consequently, the ability to reliably ascertain the molecular structures of such unknown substances by relatively simple measurements of their chromatographic retention properties is very desirable. Our present work shows a linear correlation of the logarithm of the chromatographic capacity factor with the linear sum of the appropriate structural substituent parameters for a number of organoarsenicals, separated by an ion exchange mechanism, and a number of organotins, separated by a hydrophobic mechanism. DOE

N83-16389# Transportation Research Board, Washington, D.C.
ASPHALTS, ASPHALT MIXTURES AND ADDITIVES
Scott Shuler, R. A. Jimenez, Jack E. Stephens, R. T. Woodhams, Amir F. Bissada, and Naoimi Kassabian, ed. 1982 136 p refs Sponsored by American Association of Highway and Transportation Officials and the Federal Highway Administration
(PB82-262171; TRB/TRR-843; ISBN-0-309-03320-9; LC-82-12579; ISSN-0361-1981) Avail: NTIS HC A07/MF A01; HC avail. from Transportation Research Board, 2101 Constitution Ave., NW, Washington, D.C. 20418 CSCL 13C

Specification requirements for asphalt-rubber; laboratory measurements of asphalt-rubber concrete mixtures; field evaluation of rubber-modified bituminous concrete; methods of increasing fracture toughness of asphalt concrete; evaluation of filler effect of sulfur in asphalt binder; predicting surface friction from laboratory tests; design and performance of bituminous friction course mixes; performance observations on open graded bituminous concrete overlays in Connecticut; effects of baghouse fines and mineral fillers on properties of asphalt mixes; and the effect of mix variations on asphalt pavement life are discussed. North Oakland-Sutherlin Project; dune sand aggregate mixes and dune sand sulfur mixes for asphalt concrete pavements; and asphalt concrete mixtures made with cement coated aggregates are also discussed. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N83-16390# Defence Research Information Centre, Orpington (England).
THE IN-PLANE SHEAR PROPERTIES OF CFRP/ALUMINIUM HONEYCOMB SANDWICH PANELS
Y. Noguchi and T. Furuta Sep. 1982 32 p refs Transl. into ENGLISH of rept. TR-621 National Aerospace Lab. Chofu City, Japan, Jul. 1980 11 p
(BLL-DRIC-Trans-6628(3623.66); BR85018) Avail: British Library Lending Div., Boston Spa, Engl.

The in plane shear properties in similarly constituted carbon fibre reinforced plastic (CFRP)/aluminium honeycomb sandwich panels with bias laminated and cross laminated face members were investigated. The fracture strength and fracture modes were measured on specimens with 25 deg, 0 deg, 90 deg, -25 deg and 43 deg, 0 deg, 90 deg and -45 deg laminated face members. Holographic interference techniques were used to inspect the delamination in the CFRP laminate and laminate honeycomb core interfaces. Serious defects in the sandwich panels were detected. Author

N83-16391*# Rockwell International Corp., Los Angeles, Calif.
DEVELOPMENT OF DESIGN ALLOWABLE DATA FOR CELION 6000/LARC-160, GRAPHITE/POLYIMIDE COMPOSITE LAMINATES
Richard M. Ehret, Philip R. Scanlan, and Charles D. Rosen Nov. 1982 81 p refs
(Contract NAS1-15183)
(NASA-CR-165985; NAS 1.26:165985) Avail: NTIS HC A05/MF A01 CSCL 11D

A design allowables test program was conducted on Celion 6000/LARC-160 graphite polyimide composite to establish material performance over a 116 K (-250 F) to 589 K (600 F) temperature range. Tension, compression, in-plane shear and short beam shear properties were determined for uniaxial, quasi-isotropic and + or - 45 deg laminates. Effects of thermal aging and moisture saturation on mechanical properties were also evaluated. Celion 6000/LARC-160 graphite/polyimide can be considered an acceptable material system for structural applications to 589 K (600 F). Author

N83-16392*# Hercules, Inc., Wilmington, Del.
GRAPHITE FIBER SURFACE TREATMENT TO IMPROVE IMPACT STRENGTH AND FRACTURE RESISTANCE IN SUBSEQUENT COMPOSITES Final Report
J. T. Paul, Jr. and G. A. Buntin Dec. 1982 43 p refs
(Contract NAS1-15869)
(NASA-CR-165901; NAS 1.26:165901) Avail: NTIS HC A03/MF A01 CSCL 11D

Graphite (or carbon) fiber composite impact strength improvement was attempted by modifying the fiber surface. Elastomeric particles were made into lattices and deposited ionically on surface treated graphite fiber in an attempt to prepare a surface containing discrete rubber particles. With hard, nonelastomeric polystyrene discrete particle coverage was achieved. All the elastomeric containing lattices resulted in elastomer flow and filament agglomeration during drying. Author

N83-16393*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.

AN INVESTIGATION OF ADHESIVE/ADHEREND AND FIBER/MATRIX INTERACTIONS. PART B: SEM/ESCA ANALYSIS OF FRACTURE SURFACES Final Technical Report

B. Beck, E. Widyani, and J. P. Wightman Jan. 1983 36 p refs (Grant NAG1-127)

(NASA-CR-169798; NAS 1.26:169798) Avail: NTIS HC A03/MF A01 CSCL 11D

Adhesion was studied with emphasis on the characterization of surface oxide layers, the analysis of fracture surfaces, and the interaction of matrices and fibers. A number of surface features of the fractured lap shear samples were noted in the SEM photomicrographs including the beta phase alloy of the Ti 6-4 adherend, the imprint of the adherend on the adhesive failure surface, increased void density for high temperature samples, and the alumina filler particles. Interfacial failure of some of the fractured lap shear samples is invariably characterized by the appearance of an ESCA oxygen photopeak at 530.3 eV assigned to the surface oxide layer of Ti 6-4 adherend. The effect of grit blasting on carbon fiber composites is evident in the SEM analysis. A high surface fluorine concentration on the composite surface is reduced some ten fold by grit blasting. S.L.

N83-16394*# Wyoming Univ., Laramie. Dept. of Mechanical Engineering.

THREE-DIMENSIONAL ELASTOPLASTIC STRESS ANALYSIS OF UNIDIRECTIONAL BORON/ALUMINUM COMPOSITES

Jayant M. Mahishi and Donald F. Adams Oct. 1982 37 p refs (Grant NsG-3217)

(NASA-CR-169796; NAS 1.26:169796; UWME-DR-201-107-1) Avail: NTIS HC A03/MF A01 CSCL 11D

A three dimensional elastoplastic finite element micromechanical model was developed to study the state of stress around a broken fibers in a unidirectional composite. A boron/aluminum composite consisting of 50 percent by volume of fibers in a square array and subjected to an axial loading is taken as a specific example. This loading in the fiber direction is applied in small increments, by prescribing increments of boundary displacement, until the first failure occurs. The effect of reduced material properties of the aluminum matrix material at elevated temperature is also studied. The results are presented in the form of stress contours and stress-strain plots. Author

N83-16395# North Carolina State Univ., Raleigh. Dept. of Textile Chemistry.

X-RAY AND ESR CHARACTERIZATION OF THE EFFECTS OF HIGH ENERGY RADIATION OF GRAPHITE FIBER REINFORCED COMPOSITE MATERIALS M.S. Thesis

George Michael Kent 1982 113 p refs

Avail: NTIS HC A06/MF A01

The graphite crystalline structure in graphite fiber reinforced composites (graphite/epoxy and graphite/polyimide) and graphite fiber strands before and after exposure to 0.5 MeV electron radiation up to 8000 Mrads was examined. Cured epoxy samples of tetraglycidyl-4,4'-diaminodiphenyl methane (TDGDDM) and 4,4'-diaminodiphenyl sulfone (DDS) (the matrix material for graphite/epoxy composites) were prepared at various molar ratios and irradiated with 5 and 25 Mrads of Co-60 gamma radiation at 77 K. Samples of DDS were irradiated with 5 to 30 Mrads of Co-60 radiation. Radical decay rates were obtained using electron spin resonance spectroscopy, and the radical decay at room temperature can be approximated by two simultaneous equations which describe the decay of radicals occurring in two different regions, one a fast decaying component and the other a slow decaying component. Author

N83-16396*# North Carolina State Univ., Raleigh.

EFFECT OF IONIZING RADIATION ON THE MECHANICAL AND STRUCTURAL PROPERTIES OF GRAPHITE FIBER REINFORCED COMPOSITES Ph.D. Thesis

Kaye Woodroof Wolf 1982 160 p refs Sponsored by NASA

(NASA-CR-169651; NAS 1.26:169651) Avail: NTIS HC A08/MF A01

Graphite/epoxy (T300/5208) and graphite/polyimide composites (C6000/PMR 15) were exposed to various levels of 0.5 MeV electron radiation with the maximum dose being 10,000 Mrad. A three point bending test was used to evaluate the ultimate stress and modulus of the composites. In all composites except transverse samples of C6000/PMR 15 ultimate stress values remained approximately constant or increased slightly. The modulus values remained approximately constant for all composite types regardless of the radiation level. Interfacial aspects of composites were studied. Interlaminar shear tests were performed on T300/5208 and C6000/PMR 15 composites irradiated to 10,000 Mrad. There was an initial increase in interlaminar shear strength (up to 1,000 Mrad) followed by a sharp decrease with further radiation exposure. Using scanning electron microscopy no visual differences in the mode of fracture could be detected between ruptured control samples and those exposed to various levels of radiation. Electron spectroscopy for chemical analysis (ESCA) revealed little change in the surface elements present in control and highly irradiated T300/5208 composite samples. Author

N83-16397*# Lockheed-California Co., Burbank.

REPAIR TECHNIQUES FOR GRAPHITE/EPOXY STRUCTURES FOR COMMERCIAL TRANSPORT APPLICATIONS Final Report

R. H. Stone Hampton, Va. NASA. Langley Research Center Jan. 1983 206 p refs Previously announced in IAA as A81-43645

(Contract NAS1-15269)

(NASA-CR-159056; NAS 1.26:159056) Avail: NTIS HC A10/MF A01 CSCL 11D

Composite defect sensitivity and airline damage experience and repair capabilities were surveyed. Repair concepts were screened. Repair of subelement specimens was covered. Author

N83-16398*# National Aeronautics and Space Administration, Washington, D. C.

REINFORCING ALUMINUM ALLOYS WITH HIGH STRENGTH FIBERS

A. I. Kolpashnikov, V. F. Manuylov, B. D. Chukhin, Ye. V. Shiryayev, and A. S. Shurygin Sep. 1982 9 p refs Transl. into ENGLISH from Tsvetn. Metal. (Moscow), no. 6, Jun. 1969 p 85-87 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-3542)

(NASA-TM-76980; NAS 1.15:76980) Avail: NTIS HC A02/MF A01 CSCL 11D

A study is made of the possibility of reinforcing aluminum and aluminum based alloys with fibers made of high strength steel wire. The method of introducing the fibers is described in detail. Additional strengthening by reinforcement of the high alloy system Al - An - Mg was investigated. Author

N83-16399*# National Aeronautics and Space Administration, Washington, D. C. 11d

PROSPECTS OF INCREASING THE STRENGTH OF ALUMINUM BY REINFORCING IT WITH STAINLESS STEEL WIRE (A REVIEW)

L. R. Botvina, V. S. Ivanova, and I. M. Kopev Oct. 1982 18 p refs Transl. into ENGLISH from Fiz. Khim. Obrabotki Mater. (USSR), no. 3, 1968 p 57-66 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-76992; NAS 1.15:76992) Avail: NTIS HC A02/MF A01 CSCL 11D

The theoretical and experimental strength of aluminum reinforced with stainless steel wire is analyzed. Various methods of producing the composite material and it's static and cyclical strengths are considered. The reinforcement of aluminum with stainless steel wire was accomplished from the perspective of increasing the specific strength of aluminum and it's alloys, increasing the strength of the material with respect to high and low temperatures, as well as increasing the cyclical strength. The production of the composite aluminum-stainless steel wire material with approximated or calculated strengthening is possible by any of the considered methods. The selection of the proper production

technology depends on precise details and conditions of application of the material. Author

N83-16400*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
IDENTIFICATION AND MANAGEMENT OF FILAMENT-WOUND CASE STIFFNESS PARAMETERS
V. Verderaime and M. Rheinfurth Jan. 1983 17 p refs
(NASA-TP-2117; NAS 1.60:2117) Avail: NTIS HC A02/MF A01 CSCL 11D

The high specific strength and the high specific modules made graphite epoxy laminate an expedient material substitute for the Shuttle Solid Rocket Motor steel case to substantially increase the payload performance without increasing the composite case axial growth during thrust build up which was constrained to minimize liftoff excitation effects on existing structural elements and interfaces. Parameters associated with axial growth were identified for quality and manufacturing controls. Included is an innovative method for experimentally verifying extensional elastic properties on a laminate pressurized test bottle. Author

N83-16401# Dayton Univ., Ohio.
MATERIALS SCREENING TESTS OF THE FOD IMPACT DESIGN TECHNOLOGY PROGRAM, TASK 4C Final Technical Report, Oct. 1977 - Jun. 1980
Robert S. Bertke Wright-Patterson AFB, Ohio AFWAL Feb. 1982 68 p refs
(Contract F33615-77-C-5221; AF Proj. 3066)
(AD-A119839; UDR-TR-81-14; AFWAL-TR-82-2043) Avail: NTIS HC A04/MF A01 CSCL 11/4

This report describes a study to develop screening tests to identify and evaluate candidate fan and compressor blade materials of aircraft engines which may possess superior foreign object damage (FOD) resistance. Tests were developed to determine the ballistic limit, local deformation characteristics, gross structural damage characteristics, and the fatigue strength of candidate blade materials. The data generated demonstrated that the screening tests utilized could rate and rank the candidate materials investigated. The materials investigated included 8Al-1Mo-1V and 6Al-4V titaniums, 410 stainless steel in the annealed and heat-treated conditions, a boron/aluminum composite, and a graphite/epoxy composite. Based on the results, the titanium alloys were superior followed by the stainless steel material. The composites showed very poor response to the screening tests and were ranked last. Equations were developed for each screening tests which can be used to determine the response of new candidate materials to foreign object damage. Author (GRA)

N83-16402# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
MATERIAL CHARACTERIZATION. PART B: MECHANICAL PROPERTIES OF 2 METAL MATRIX COMPOSITE MATERIALS Interim Technical Report, 1 Oct. 1977 - 30 Jun. 1980
Susan A. Emery May 1982 49 p refs
(Contract F33615-77-C-5221; AF Proj. 3066)
(AD-A119829; UDR-TR-80-37-Vol-2; AFWAL-TR-82-2042-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 11/4

This report describes mechanical property data collected in support of a fan blade analysis model. The development of the blade model is part of a foreign object damage (FOD) study of jet engine fan blades. Use of the properties in the model allows one to evaluate potential fan blade materials. Part A of this report contains a discussion of the mechanical property tests conducted on two metallic materials: 410 stainless steel and 8Al-1Mo-1V titanium. These two materials were selected because of their use in the J-79 blade and F-101 blade, respectively. Part B of the report contains a discussion of mechanical property tests conducted on the two composite components of a hybrid composite blade: boron/2024 aluminum and stainless steel wire mesh/2024 Aluminum. These two composites are used in the hybrid composite APSI blade. Quasi-static tensile tests and torsional tests were conducted on unidirectional specimens for the two composites indicated above. GRA

N83-16403# Army Materials and Mechanics Research Center, Watertown, Mass. Mechanics of Materials Div.
STUDIES OF TENSION TEST SPECIMENS FOR COMPOSITE MATERIAL TESTING Final Report
Donald W. Oplinger, Kanu R. Gandhi, and Burton S. Parker Apr. 1982 26 p refs Presented at the TTCP Review: Technical Panel TP-3, Ottawa, May 1978
(DA Proj. 1L1-62105-AH-84)
(AD-A120257; AMMRC-TR-82-27) Avail: NTIS HC A03/MF A01 CSCL 11/4

This report covers stress analysis and experimental studies of four types of tension specimens designed for testing composite materials. Two ASTM specimen types (D3039 tab-ended and D638 dogbone) are considered, along with the bowtie (flat bar with linear taper) design developed by Grumman and a streamline design developed at AMMRC. Stress analyses of the first three types show them to be subjected to high shear stresses and tensile stress concentrations which tend to degrade their performance. Experimental studies generally tended to confirm that failures initiated where the stress peaks were predicted, and suggest that elimination of such peaks would lead to a better-performing tension specimen. Stress analysis of the AMMRC streamline design showed how shear stress levels and indicated that the design is free of tensile stress concentrations. Results of efforts aimed at experimental evaluation of the streamline specimen indicate that it has much promise as an improved design for tension testing, both under monotonic and cyclic loading. Author (GRA)

N83-16404# Oak Ridge National Lab., Tenn. Solid State Div.
HEAT TREATMENT EFFECTS IN NEUTRON TRANSMUTATION DOPED SILICON
John W. Cleland Oct. 1981 19 p refs Presented at the Intern. Conf. on Neutron Irradiation Effects, Argonne, Ill., 9 Nov. 1981
(Contract W-7405-eng-26)
(DE82-003998; CONF-811145-4) Avail: NTIS HC A02/MF A01

It is shown by electrical property measurements that a significant concentration (10 to the 14th power minus 10 to the 15th power/cm cu) of an impurity (presumably Li) which can be activated by heat treatment at > or = 650 C is present in commercially available float zone (FZ) refined, Czochralski (Cz) grown or neutron transmutation doped (NTD) Si. Most (90%) of these donors become inactive in FZ or Cz Si after heat treatment within a few days at ambient temperature, but many (40 to 70%) of them are still active as donors after several months in polycrystalline (PX) or NTD Si that contains lattice defects or radiation damage. Virtually all of these donors can be reactivated by a subsequent heat treatment at > or = 650 C. These results are especially significant because heat treatment is required to remove oxygen-related donors formed in Cz Si during cooldown after growth or to remove radiation damage and obtain the anticipated carrier concentration in NTD FZ or Cz Si. DOE

N83-16405# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
CORROSION-INDUCED MICROSTRUCTURAL CHANGES IN A US CORE GRAPHITE
W. P. Eatherly and D. A. Lee 1981 4 p Presented at the Colloq. on the Transport of Fission Products in Matrix and Graphite, Berlin, 9-11 Nov. 1981
(Contract W-7405-eng-26)
(DE82-003995; CONF-811141-2) Avail: NTIS HC A02/MF A01

The results apply to Great Lakes grade H-451 graphite. This graphite is structurally similar to the German reflector grades and hence should be applicable to them if similar impurity levels are obtained. Moreover, these results extend and confirm the behavior pattern exhibited by the fuel matrix material A3-3, although the effects are more pronounced in A3-3 presumably due to its resin type binder and low heat treatment temperatures. DOE

N83-16406# Oxford Univ. (England). Engineering Lab.
IMPACT TESTING OF FIBRE REINFORCED COMPOSITE MATERIALS

J. Harding and L. M. Welsh 1982 20 p refs Presented at 4th Intern. Conf. on Composite Mater., Tokyo, Oct. 1982
(OUEL-1415/82) Avail: NTIS HC A02/MF A01

Techniques for determining the mechanical properties of composite materials under tensile impact loading are reviewed. A method, based on the standard tensile version of the split Hopkinson's pressure bar apparatus is described and the validity of data obtained by this means is established. Dynamic stress-strain curves for unidirectionally reinforced carbon fiber reinforced plastics (CFRP) are presented and compared with those determined at lower rates. Stress equilibrium across the specimen is attained at an early stage in the test. Specimen strain is determined to an accuracy of + or - 3% and tensile modulus to 5%. Over a range from 0.001/sec to 1000/sec the modulus, fracture strength and failure mode of unidirectionnaly-reinforced CFRP are found to be independent of strain rate. Author (ESA)

N83-16407# *Versar, Inc., Springfield, Va.*
ASSESSMENTS OF FUTURE ENVIRONMENTAL TRENDS AND PROBLEMS OF INCREASED USE, RECYCLING, AND COMBUSTION OF FIBER-REINFORCED, PLASTIC AND METAL COMPOSITE MATERIALS Final Report
George Provenzano 14 Jul. 1982 266 p refs
(Contract EPA-68-02-3636)
(PB82-255514; EPA/600/8-82/019) Avail: NTIS HC A12/MF A01 CSCL 11D

Future environmental concerns related to the projected utilization, recycling, and combustion of composite materials are discussed. Based on the results, the Environmental Protection Agency will make a preliminary determination of whether further study is warranted for any of the potential environmental concerns that the study identified as being associated with composite materials use and disposal and assign research priorities.
Author (GRA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N83-16408# Electricity Council, London (England).
INCREASING THE RATE OF DEPOSITION DURING ELECTROPLATING PROCESSES
V. Apetenok and V. Yanson 9 Nov. 1982 9 p Transl. into ENGLISH from Latv. Lauksaimn. Akad. Raksti (USSR), no. 1111, 1977 p 24-29
(BLL-0A-Trans-1758-(6196.3)) Avail: British Library Lending Div., Boston, Spa, Engl.

The source of asymmetrical alternating current was developed based on thyristors. The rate of asymmetry under constant conditions of electrolysis (concentration, temperature, the composition of electrolyte and electrodes) on the rate of the process and the quality of the cathode deposit was established. Author

N83-16409# Electricity Council, London (England).
THE ANODIC OXIDATION OF MANGANESE ON A PLATINUM ELECTRODE IN POLAROGRAPHIC CONDITIONS IN SULPHURIC ACID
O. A. Songina and N. G. Kemeleva 9 Nov. 1982 10 p refs Transl. into ENGLISH from Izv. Akad. Nauk Kazakhskoi SSR (USSR), v. 17, no. 2, 1967 p 38-42
(BLL-OA-Trans-1762-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

Compounds of manganese (II) were examined polarographically on the background of more concentrated sulfuric acid. Author

N83-16410# Electricity Council, London (England).
ELECTROLYTIC REGENERATION OF AN ETCHING MEDIUM
H. Rainer 28 Oct. 1982 17 p Transl. into ENGLISH of West German Patent no. 2650912 (6 Nov. 1976)
(BLL-OA-Trans-1917-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

A process and also an arrangement for the regeneration of a liquid etching medium enriched with monovalent copper during the etching of copper and containing chlorine ions by means of electrolysis taking place between an anode and a cathode, during which copper ions are deposited as metallic copper at the cathode and the excess monovalent copper is oxidized at the anode to bivalent copper is described. Author

N83-16411# Electricity Council, London (England).
THE KINETICS AND MECHANISM OF THE REACTION OF OZONE WITH SULPHIDES
S. D. Razumovskii, E. I. Shatokhina, A. D. Malievskii, and G. E. Zaikov Nov. 1982 9 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Khim. (USSR), v. 24, 1975 p 543-546
(BLL-OA-Trans-1934-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

Reactions of ozone with organic compounds of sulphur have been examined manly with respect to practical applications: in the desulphurization of petroleum and the products of refining of petroleum, in the production of various sulphones and sulphoxides, and in the examination of the composition of sulphur vulcanizers of rubber. The mechanism of the resultant chemiluminiscence was studied. The kinetics and mechanism of the interaction of ozone with a number of sulphides and disulphides are reported. E.A.K.

N83-16412# Electricity Council, London (England).
CYANOGEN FORMATION IN SILVER CYANIDE ELECTROLYTES
A. VonKrusenstjern and W. Mussinger Oct. 1982 12 p refs Transl. into ENGLISH from Metalloberflaeche (West Germany), v. 16, no. 9, 1962 p 263-266
(BLL-OA-Trans-1876-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

In the electrolysis of aqueous solutions of alkali metal cyanides using insoluble electrode it is generally observed that only very small quantities of gas are liberated at the anode. In experiments by H. Schmidt and H. Meinert the ratio of the hydrogen gas liberated at the cathode to the gas liberated at the anode was 19:1, even in very alkaline electrolytes. This can only be due to limited release of the OH- ions present in the solution. Since there is no possibility of the formation of metal ions at the anode when insoluble anode materials are used, another anodic oxidation process must preferentially be taking place. L.F.M.

N83-16413# Electricity Council, London (England).
ETCHING AGENT FOR THE DISSOLUTION OF COPPER, PROCESS FOR THE PREPARATION AND USE OF THE REAGENT
9 Nov. 1982 11 p Transl. into ENGLISH of Swiss patent (Appl. No. 7309/74, 29 Apr. 1977)
(BLL-OA-Trans-1918-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

An etching agent for the dissolution of copper, a process for its preparation, and its use in the removal of the copper which covers a nonconducting substrate (as in the manufacture of printed circuits) are described. Author

N83-16414# Electricity Council, London (England).
INVESTIGATIONS INTO ANODE PROCESSES IN CYANIDE ELECTROLYTES
A. VonKrusenstjern and J. Meier 18 Oct. 1982 12 p refs Transl. into ENGLISH from Metalloberflaeche (West Germany), v. 18, no. 11, 1964 p 330-333
(BLL-OA-Trans-1877-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

During electrolysis with insoluble anodes in aqueous alkali cyanide solution oxygen is evolved as well as cyanogen. The reaction mechanism is influenced by the type of anode and the state of its surface as well as by the experimental conditions. The colorimetric absorption of the cyanogen formed increases when

the solution is heated or stirred. The pH of the solution rises with increasing alkali cyanide concentration because of hydrolysis. The tendency for oxygen to be evolved also increases. Additions of alkali carbonate produce the same effects. Under certain conditions the formation of cyanogen can also be observed in a copper cyanide electrolyte with initially soluble electrodes. Author

N83-16415 Royal Signals and Radar Establishment, Malvern (England).
THE PHASE DIAGRAM Cd-Hg-Te
A. W. Vere, D. J. Williams, and J. B. Mullin 1982 39 p refs (RSRE-3387; BR84602) Avail: Issuing Activity

Literature on the Cd-Hg-Te phase diagram is discussed and data from experimental studies of the microstructure of alloys from the Te-rich carrier of the ternary phase diagram are presented. The relative merits of the data are assessed and the preferred results in cases where severe discrepancies appear between the various results are indicated. The thermodynamic data available were converted to standard values and summarized in tabular form. Author (ESA)

N83-16416# New South Wales Univ., Kensington (Australia).
OXIDATION REACTIONS OF HETEROCYCLIC COMPOUNDS WITH LEAD TETRA ACETATE M.S. Thesis
Sumantri Jan. 1981 102 p refs
Avail: NTIS HC A06/MF A01

An investigation of the reactivity of various heterocyclic compounds to oxidation with lead tetra acetate is described. Benzimidazole is slowly oxidized by the reagent to give 2-acetoxy benzimidazole, 2-benzimidazolone, N,N'-diacetyl-o-phenylene diamine and other minor products. These products result from initial attack by the reagent at position 2 of the ring system and mechanisms to explain their formation are suggested. The reactivity of position 2 is further illustrated by attempted oxidation of 2-methyl benzimidazole which was inert. Further oxidation of 2-benzimidazolone gave 5,6-dihydro benzimidazol-2,5,6-trione. Benzothiazole was very unreactive towards lead tetra acetate and only a trace of 2-benzothiazolone was formed. 2-ethyl benzothiazole was completely unreactive. Benzoxazole showed much higher reactivity and a variety of products were identified, consistent with initial attack by the reagent at both position 2 and position 5(6) of the ring. Some dimeric and ring opened products were also obtained. Reactivity of the ring system was reduced by substitution of a methyl group at position 2 and blocked by a phenyl group at C-2. Author

N83-16417*# California Univ., Berkeley. Dept. of Chemical Engineering.
ANTI-MISTING ADDITIVES FOR JET FUELS Final Technical Report, 1 Jan. - 30 Sep. 1982
E. A. Grens, II and M. C. Williams 1982 10 p refs
(Contract NCC2-164)
(NASA-CR-169751; NAS 1.26:169751) Avail: NTIS HC A02/MF A01 CSCL 21B

The ignition characteristics of sprays, created by wind shear action, of Jet-A fuel containing polyisobutylene additives wee examined over ranges of air velocities from 45 to 90 m/s and of fuel/air mass ratios of 0.20 to 8.0. Ignition was by calibrated sparks of energies up to about 0.5 J and by a butane/oxygen flame at 165 J/s. The polymeric additives studied included the grades L80, L160, and L200 from Exxon Chemical and B200 and B230 from BASF. The ignition suppression ability of the additives, as well as their observed anti-misting (AM) behavior, ranked exactly as their molecular weights (viscosity average, M sub v) with 400-500 ppm of L80 (M sub v = 0.68 x 1,000,000) being required to suppress ignition of a spray at 51 m/s, 1.8 fuel/air mass ratio, by a 0.55 J spark while only 10 ppm of B230 (M sub v = 7.37 x 1,000,000) was required for the same conditions. The additive concentrations (L160) required for ignition suppression increased with increasing air velocity and with increasing fuel/air ratio. Author

N83-16418*# Texas Univ., Austin. Dept. of Chemistry.
PREPARATION, CHARACTERIZATION, PHYSICAL TESTING AND PERFORMANCE OF FLUROCARBON MEMBRANES AND SEPARATORS Final Report
Richard J. Lagow and Earl T. Dumitru 17 Jan. 1983 19 p refs (Grant NsG-3190)
(NASA-CR-169756; NAS 1.26:169756) Avail: NTIS HC A02/MF A01 CSCL 07D

The direct fluorination method of converting carefully selected hydrocarbon substrates to fluorinated membranes was successfully applied to produce promising, novel membranes for electrochemical devices. A family of polymer blends was identified which permits wide latitude in the concentration of both crosslinks and carboxyl groups in hydrocarbon membranes. The membranes of paragraph two were successfully fluorinated. Author

N83-16419*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
BASIC INVESTIGATION INTO THE ELECTRICAL PERFORMANCE OF SOLID ELECTROLYTE MEMBRANES
Robert Richter 15 Aug. 1982 37 p refs Sponsored by NASA (NASA-CR-169790; JPL-Pub-82-75; NAS 1.26:169790) Avail: NTIS HC A03/MF A01 CSCL 07D

The electrical performance of solid electrolyte membranes was investigated analytically and the results were compared with experimental data. It is concluded that in devices that are used for pumping oxygen the major power losses have to be attributed to the thin film electrodes. Relations were developed by which the effectiveness of tubular solid electrolyte membranes can be determined and the optimum length evaluated. The observed failure of solid electrolyte tube membranes in very localized areas is explained by the highly non-uniform current distribution in the membranes. The analysis points to a possible contact resistance between the electrodes and the solid electrolyte material. This possible contact resistance remains to be investigated experimentally. It is concluded that film electrodes are not appropriate for devices which operate with current flow, i.e., pumps though they can be employed without reservation in devices that measure oxygen pressures if a limited increase in the response time can be tolerated. Author

N83-16420# Princeton Univ., N. J. Dept. of Chemical Engineering.
TORSIONAL BRAID ANALYSIS (TBA): TIME-TEMPERATURE-TRANSFORMATION (TTT) CURE DIAGRAMS OF THERMOSETTING EPOXY/AMINE SYSTEMS Technical Report, Aug 1980 - Aug. 1982
John K. Gillham and John B. Enns Sep. 1982 60 p refs
(Contract N00014-76-C-0200; NR Proj. 356-504)
(Ad-A119836; TR-25) Avail: NTIS HC A04/MF A01 CSCL 11/9

The conversion of liquid resin to solid thermoset during the process of cure can be monitored using a substrate coated with the reactive system as the specimen in a torsion pendulum experiment (TBA). Measurement of times to gelation and vitrification at a series of temperatures results in an isothermal time-temperature-transformation (TTT) cure diagram which can be used for comparing different systems. In this report molecular and macroscopic TTT cure diagrams are considered: it is demonstrated that TBA is a convenient method for generating macroscopic TTT cure diagrams. The influence of chemical structure on the kinetics and macroscopic properties was investigated by comparing aliphatic and aromatic tetrafunctional amines with diepoxides of varying molecular weights. The paper also describes automation of the TBA instrument using a desk-top calculator. Author (GRA)

N83-16421# Colorado State Univ., Fort Collins. Dept. of Chemistry.
SPECTROSCOPIC STUDIES OF TOLUENE IN SIMPLE MOLECULAR LIQUIDS
J. Lee, F. Li, and E. R. Bernstein 28 Sep. 1982 23 p refs
(Contract N00014-79-C-0647)
(AD-A119821; TR-9) Avail: NTIS HC A02/MF A01 CSCL 07/3

Absorption and emission spectra and fluorescence lifetimes are reported for the 1B1 state of toluene in a number of simple hydrocarbon solvents CH4, C2H6, C3H8, C2H4, C3H6, and

1-C4H8). Spectroscopic data such as gas to liquid shifts, intermolecular Franck-Condon shifts, line widths, and their temperature dependences can be employed to study potentials in the cryogenic liquid near the equilibrium separation for solvent and solute. Life-times as a function of concentration and temperature indicate that toluene excimers do not form, apparently due to steric hindrance. The results for toluene are compared and contrasted to those for benzene. The intermolecular interactions are nearly identical for the two systems suggesting polarizabilities and not dipole moments are important for CnHm solvents and hydrocarbon probe systems. Toluene relaxation kinetics and their temperature dependences are discussed. Author (GRA)

N83-16422# Wisconsin Univ., Madison. Dept. of Chemistry.
PHOTOLUMINESCENCE AND ELECTROLUMINESCENCE AS PROBES OF INTERFACIAL CHARGE-TRANSFER PROCESSES RELEVANT TO CADMIUM SULFO-SELENIDE-BASED PHOTOELECTROCHEMICAL CELLS
Holger H. Streckert, Jiu-ru Tong, Michael K. Carpenter, and Arthur B. Ellis 23 Sep. 1982 23 p refs Submitted for publication
(Contract N00014-78-C-0633; NR Proj. 051-690)
(AD-A120173; UWIS/DC/TR-82/1) Avail: NTIS HC A02/MF A01 CSCL 20/2

Samples of single-crystal, n-type Cd(X)Se(1-X) (where X is = to 1.000, 0.74, 0.49, 0.26, 0.11, 0.00) emit when excited with ultraband gap excitation. The 295 K band gaps monotonically decrease with X from approx. 2.4 eV for CdS to approx. 1.7 eV for CdSe. Photoluminescence (PL) spectra are sharp and have band positions which vary nearly linearly with composition: lumbda(max) (nm) approximately equal to 718-210 X. The energetic proximity to the band gap, temperature dependence and decay times are all consistent with a description of the PL as edge emission. Measured PL efficiencies, phi(r), are approx. 0.0004 in air. When the samples are used as photoanodes in photoelectrochemical cells (PECs) employing aqueous polysulfide electrolyte, the emission of intensity can be quenched by the passage of photocurrent. The extent of quenching can be correlated with the photocurrent quantum efficiency. Electroluminescence (EL) can be initiated by using the CdS(X)Se(1-X) samples as dark cathodes in aqueous, alkaline, peroxydisulfate electrolyte at potentials cathodic of approx.-0.9 to -1.1V vs. SCE. The EL spectral distribution for a given sample is similar to that observed in PL experiments and indicates that the same emissive excited state is involved. Author (GRA)

N83-16423# Wisconsin Univ., Madison. Dept. of Chemistry.
PHOTOLUMINESCENCE AND ELECTROLUMINESCENCE IN GRADED CADMIUM SULFOSELENIDE ELECTRODES: APPLICATIONS TO PHOTOELECTROCHEMICAL CELLS
Michael K. Carpenter, Holger H. Streckert, and Arthur B. Ellis 23 Sep. 1982 25 p refs Submitted for publication
(Contract N00014-78-C-0633; NR Proj. 051-690)
(AD-A120244; UWIS/DC/TR-82/3) Avail: NTIS HC A02/MF A01 CSCL 07/4

Inhomogeneous samples of n-type CdS sub X Se sub 1-x (0 < or = X < or = 1) have been prepared by vapor-phase diffusion of S into a single-crystal CdSe substrate. Characterization of the samples by Auger electron spectroscopy (AES)/Ar ion sputter etching reveals that S has substituted for Se in the lattice to produce a graded region: The depth profile analysis indicates that from a composition with X nearly unity at the surface, X monotonically declines to zero over a distance of about 1 micron. Correspondingly, the band gap diminishes from about 2.4 eV for the CdS-like composition to about 1.7 eV for CdSe. Photoluminescence (PL) and electroluminescence (EL) from the graded material appear to derive from the luminescence of the CdS sub X Se sub 1-x compositions which comprise the graded region: emission from about 500-750 nm matches the spectral region spanned by PL and EL from homogeneous, single-crystal CdS sub X Se sub 1-X samples which emit near their band gap energies. A previously established linear correlation between emission maxima (nm) and composition in homogeneous CdS sub X Se sub 1-X samples provides a spatial probe of election hole(e- - h+) pair recombination in the inhomogeneous material: Regions from which PL and EL originate can be inferred from their spectral distribution in combination with the AES/depth profile data. GRA

N83-16424# Los Alamos Scientific Lab., N. Mex.
TWO BISMUTH SULFATE-SULFURIC ACID HYBRID THERMOCHEMICAL HYDROGEN CYCLES. SOME EXPERIMENTAL WORK RELATED TO THE CYCLES AND THEIR POSSIBLE IMPROVEMENT. OUTLINE OF A PROPOSED ANTIMONYL SULFATE CYCLE IN WHICH SULFUR DIOXIDE AND OXYGEN ARE SEPARATELY EVOLVED
Wesley M. Jones 1982 11 p refs Presented at the 4th World Hydrogen Conf., Pasadena, Calif., 13-17 Jun. 1982 Submitted for publication
(DE82-002389; LA-UR-81-2928; CONF-820605-2) Avail: NTIS HC A02/MF A01

Thermochemical hydrogen production is discussed. Equilibrium pressures in the decomposition of Bi2(SO4)3 and alpha and beta-Bi2(SO4)2; survey experiments on the thermal decomposition of Bi2(SO4)3; hydrates sorption of H2SO4 solutions by the solids; and possible simplification of the SO3-SO2-O2 separation problem with a sulfuric acid-antimonyl sulfate hybrid cycle are considered. DOE

N83-16425# Mound Lab., Miamisburg, Ohio.
MUTUAL DIFFUSION COEFFICIENTS OF He-Ne AND He-Xe FROM 350 TO 1300 KELVIN
1982 17 p refs
(Contract DE-AC04-76DP-00053)
(DE82-021293; MLM-30009(OP)) Avail: NTIS HC A02/MF A01

Measurements were made in a Hastelloy-X diffusion cell. The apparatus is mounted vertically in a Lindberg furnace. Helium is introduced into the upper chamber simultaneously with either neon or xenon in the lower chamber and, as the gases diffuse, samples are withdrawn. Sample analyses were made on a mass spectrometer. Measured diffusion coefficients agreed well with previously published data using an independent experimental method. Marrero and Mason correlations, were verified. Mutual consistency relations which exist among the transport properties were used to establish the degree of agreement between mixture viscosities, corresponding states correlations and the diffusion coefficient. Comparison with theoretical diffusion coefficients from intermolecular potentials was made. The HFD potential reproduced the available experimental data best for He-Ne while He-Xe data were best represented by the (m-6-8) potential 3 figures. DOE

N83-16426# Sandia Labs., Albuquerque, N. Mex. Shock Wave and Explosive Physics Div.
EXPERIMENTAL RESULTS FROM COMBUSTION OF HYDROGEN:AIR MIXTURES IN AN INTERMEDIATE-SCALE TANK
W. B. Benedick, J. C. Cummings, and P. G. Prassinos 1982 15 p refs
(Contract DE-AC04-76DP-00789)
(DE83-001266; SAND-82-1212A) Avail: NTIS HC A02/MF A01

Sandia National Laboratories is currently involved in several experimental projects to provide data that will help quantify the threat of hydrogen combustion during LWR accidents. One project which employs several experimental facilities is the Variable Geometry Experimental System (VGES). The purpose of this paper is to present a description of and experimental results from one of these facilities: an intermediate scale burn tank (approx. 5 m(3)). The data provided by this facility can be used in the development of analytical models to predict hydrogen combustion behavior along with providing a means of assessing present and future analytical models. DOE

N83-16427# California Univ., Santa Barbara. Dept. of Chemical and Nuclear Engineering.
MASS TRANSFER AND CHEMICAL REACTION OF GASEOUS SPECIES IN NON-CATALYTIC AND CATALYTIC POROUS MEDIA SUPPORTING CATALYTIC AND NON-CATALYTIC LIQUIDS
Robert G. Rinker 1981 7 p refs

(Contract DE-AT03-76ER-70234)
(DE82-021713; DOE/ER-70234/T1) Avail: NTIS HC A02/MF A01

The behavior of supported liquid phase catalysts (SLPC) was investigated both experimentally and theoretically by studying the transport of mass accompanied by homogeneously catalyzed chemical reaction in SLPC under transient as well as steady flow conditions. The kinetics and mechanistic behavior of selected homogeneous catalysts consisting of soluble transition metal complexes were also examined. Efforts to formulate a general model (backed by experiments) for the overall efffective diffusivity which includes the contribution of the gas and liquid phases as well as surface diffusion and shows the effects of liquid loading, liquid properties, relative gas solubilities, and pore size distributions in the support media are reported as well as mathematical formulations for extracting SLPC parameters from transient response information resulting from step and/or impulse changes in gaseous feed composition to multiphase flow systems containing dry porous media or liquid pools. DOE

N83-16428# TRW Energy Systems Group, Morgantown, W. Va.
DESIGN AND PERFORMANCE OF A CAPACITANCE PROBE FOR MONITORING AVERAGED PARAMETERS AND INDIVIDUAL EVENTS IN A HIGH-TEMPERATURE, FLUIDIZED-BED REACTOR
G. E. Fasching, D. R. Goff, and D. A. Maxfield Morgantown, W. Va. DOE Jul. 1982 48 p
(Contract DE-AC21-81MC-6050)
(DE82-020148; DOE/MC-16050/1197) Avail: NTIS HC A03/MF A01

Improved instrumentation is needed both for operation of and research into the mechanics of fluidized beds. The capacitance probe described in this report has the capability of measuring overall bed parameters such as height and density on a time-averaged basis as well as high-speed measurements that can yield insight into the details of the fluidized bed itself. This segmented probe uses guarded electrodes to control the portion of the bed that the active segment is sensitive to and high-frequency excitation to improve the ratio of capacitive to resistive current. Phase-angle detection is used to cancel the resistive component of the detector current and to separate the capacitive components. The high-speed data is processed along with sample data showing some of the potential measurements that can be made in fluidized beds. DOE

N83-16429# Department of Energy, Pittsburgh, Pa.
TEST REPORT ON THE COMBUSTION OF PERC AND LBL WOOD OILS Final Report
James M. Ekmann and Richard B. Snedden Jan. 1982 62 p
(DE82-004485; DOE/PETC-TR-82/3) Avail: NTIS HC A04/MF A01

A series of small scale combustion tests were performed on two separate samples of biomass derived oils. They represented a fuel analogous to a petroleum based residual oil and a distillate product of the crude. The tests were conducted in a twenty horsepower, firetube boiler used to study liquid synthetic fuel combustion. The system was instrumented and the test conditions were selected in such a manner that the boiler performance data and pollutant emissions could be compared to a series of tests, in this unit, when No. 2 and No. 6 fuel oil were burned. In general, both biomass derived fuels could be burned successfully, achieving levels of boiler performance similar to those obtained when burning petroleum based fuel oils. Emissions of NO/sub x and SO2 were in line with the low nitrogen and sulfur content of the fuels and comparable to the data for No. 2 fuel oil. Although operating problems were encountered due to the flow properties of both fuels and a lack of homogeneity in the heavier biomass fuel, these could be overcome by proper design of the fuel handling system. DOE

N83-16430# Mound Lab., Miamisburg, Ohio.
DEVELOPMENT OF ULTRAFILTRATION AND ADSORBENTS: OCTOBER 1980 - MARCH 1981
Melvin K. Williams, C. Mark Colvin, Raymond C. Roberts, and William H. Bond 11 Dec. 1981 33 p refs
(Contract DE-AC04-76DP-00053)
(DE82-006177; MLM-2869) Avail: NTIS HC A03/MF A01

Reverse osmosis, on a pilot plant scale, was successful in removing large percentages of cesium-137 from aqueous streams. The relative effectiveness of three membrane types, 0, 50, and 97% salt rejection, in cesium removal was explored. The 97% salt rejection membrane was the most effective, generally removing 97% of the cesium. An interaction design experimental series was performed to determine the extent of interference, from factors found previously, on the removal of cesium-137 by four ion exchange resins. The interfering factors used were ionic sodium, potassium, and calcium. These factors were found to have no effect on cesium removal by the resins at the ionic concentrations that are amenable to resin treatment. The removal of cesium-137 from a solution containing a large amount of sodium hydroxide was laboratory tested. The best process, under the existing conditions, was found to be chemical precipitation. The precipitation could be accomplished by sodium tetraphenyl boron or copper ferrocyanide. DOE

N83-16431# Department of Energy, Pittsburgh, Pa. Energy Technology Center.
COMPUTER PROCEDURES FOR CONVERTING DISTILLATION TEMPERATURES MEASURED AT REDUCED PRESSURES TO NORMAL BOILING POINTS FOR UNDEFINED HYDROCARBON MIXTURES
M. L. Weiss 14 Dec. 1981 35 p refs
(DE82-006023; DOE/PETC-TR-82/4) Avail: NTIS HC A03/MF A01

Computer codes were devised for converting distillation temperatures measured at subatmospheric pressures to normal boiling points for undefined hydrocarbon mixtures based on the Maxwell-Bonnell correlation. The computer codes provide a solution for computational problems specific to the distillation of coal-derived liquids and improve the speed and accuracy of the data processing. About sixty sets of subatmospheric distillation data were processed by the computer codes. DOE

N83-16432# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
A LOCAL-COMPOSITION MODEL FOR EQUATIONS OF STATE FOR MIXTURES
Wallace B. Whiting and John M. Prausnitz Nov. 1981 16 p refs Presented at the Ann. Meeting of the Am. Inst. of Chem. Eng., New Orleans, 8-12 Nov. 1981
(Contract W-7405-eng-48)
(DE82-004818; LBL-13568; CONF-811108-12) Avail: NTIS HC A02/MF A01

A method to calculate high pressure vapor-liquid equilibria for asymmetric systems, especially those containing one or more polar components, is discussed. DOE

N83-16433# California Univ., Livermore. Lawrence Livermore Lab.
THE DISPARATE SPATIAL AND TEMPORAL SCALE PROBLEM IN COMBUSTION MODELING: A PROPOSED REMEDY
Edward J. Kansa Nov. 1981 34 p refs
(Contract W-7405-eng-48)
(DE82-004968; UCID-19248) Avail: NTIS HC A03/MF A01

Two problems inherent in the numerical modeling of the dispersal of hazardous material and its combustion, namely the disparate time and spatial scales, are addressed. The wide range of time scales found in combustion can best be handled by stiff time integration schemes. However, the disparate spatial scales which continuously change with time must be treated by an adaptive regridding algorithm. The method chosen for adaptive regridding is quite similar to Miller's moving finite element (MFE) approach. By choosing an implicit time marching scheme, the residual errors of the finite difference equations are iteratively reduced by permitting both variations in the dependent variables and the spatial grid, subject to inequality constraints. Thus, the method of solution

for both the dependent variables and the spatial grid can be cast into a sequence of minimization problems. For convenience, an orthogonal grid on moving elastic computational bricks of nonuniform size will be considered. DOE

N83-16434# Ames Lab., Iowa.
A SURVEY OF ORGANIC ACID ELUENTS FOR ANION CHROMATOGRAPHY M.S. Thesis - Iowa State Univ.
David Eugene Book Oct. 1981 74 p refs
(Contract W-7405-eng-82)
(DE82-005448; IS-T-969) Avail: NTIS HC A04/MF A01

Of all the potential eluents surveyed (including aromatic, sulfonic, phosphonic, among other acids), only the carboxylic acids and the nitrophenols are recommended as eluents for anion chromatography. The concentration of the eluent should be in the range 5 x 10 to the minus 5 power to 1 x 10 to the minus 3 power M. The eluent should have the same charge as inorganic anions, a higher charge than organic acid samples. Choice of eluents for separation of halides, chloride and sulfate, multivalent inorganic anions, small alkyl acids, and aromatic acids is discussed. DOE

N83-16435# California Univ., Livermore. Lawrence Livermore Lab.
THE USE OF POLARIZED X-RAYS FOR IMPROVED DETECTION LIMITS IN ENERGY DISPERSIVE X-RAY SPECTROMETRY
Richard W. Ryon, John D. Zahrt (Univ. of Northern Arizona), Peter Wobrauschek (Atomic Inst. of the Austrian Univ., Vienna), and Hannes Aiginger (Atomic Inst. of the Austrian Univ., Vienna) Nov. 1981 20 p refs Presented at the 30th Ann. X-ray Conf., Denver, 3-7 Aug. 1981
(Contract W-7405-eng-48)
(DE82-004390; UCRL-85836-Rev-1; CONF-810854-2-Rev-1) Avail: NTIS HC A02/MF A01

The use of polarized X-rays to excite fluorescence spectra with decreased backgrounds and improved detection limits is reaching a mature state of development. With bulk, low-Z specimens, polarized X-ray sources have produced detection limits which are about 1 to 3 times lower than are obtained with the best unpolarized photon sources. Based upon experience and the known properties of larger solid angle geometries, further significant to dramatic improvements are anticipated. Spectrometers using secondary fluorescers in the orthogonal beam geometry are in general use where monochromatic excitation and low detection limits are required. The materials used to produce polarized X-rays can be substituted in place of the secondary fluorescers and used to advantage in many applications. DOE

N83-16436# Rockwell International Corp., Golden, Colo. Product Integrity and Surveillance.
REACTION OF OXYGEN WITH PLUTONIUM HYDRIDE
Jerry L. Stakebake 12 Nov. 1981 26 p refs
(Contract DE-AC04-76DP-03533)
(DE82-002096; RFP-3096) Avail: NTIS HC A03/MF A01

Kinetics for the reaction of oxygen with plutonium hydride have been measured in 10 torr of oxygen and over a temperature range of 90 to 360 C. The initial reaction forms a protective oxide film. A secondary linear reaction occurs after formation of the protective film. Most of the data was obtained using a plutonium-1 wt% gallium alloy to form PuH20. Some information is presented on the oxidation of PuH27 prepared from unalloyed plutonium. DOE

N83-16437# Oak Ridge National Lab., Tenn. Chemistry Div.
KINETICS AND SELECTIVITY IN THE FISCHER-TROPSCH SYNTHESIS
R. A. Strehlow and E. C. Douglas 1981 13 p refs Presented at the Ann. Meeting of the Inst. of Chem. Engr., New Orleans, 8 Nov. 1981
(Contract W-7405-eng-26)
(DE82-003999; CONF-811108-9) Avail: NTIS HC A02/MF A01

The work supports the assumption that chain lengthening reactions are rapid and also shows that the hydrogenation of olefins to form paraffins can be minimized by control of the hydrogen pressure. A metallocylcobutane intermediate in the Fischer-Tropsch reaction appears to be plausible. It was found that olefins homologate on iron catalysts in competition with hydrogenation. Since the homologation reaction occurs to an enhanced extent at lower contact times, it appears to be a fast reaction compared with hydrogenation and may share common intermediates with the Fischer-Tropsch synthesis. DOE

N83-16438# Purdue Univ., Lafayette, Ind. School of Civil Engineering.
PHYSICS AND CHEMISTRY OF ALKALI-SILICA REACTIONS
Sidney Diamond, R. S. Barneyback, Jr., and L. J. Struble 1981 12 p refs Presented at the Conf. on Alkali-Aggregate Reactions in Concrete, Cape Town, South Africa, 30 Mar. - 3 Apr. 1981
(Contract DE-AS02-78CS-40222)
(DE82-007345; DOE/CS-40222/3; CONF-8103111-1) Avail: NTIS HC A02/MF A01

Alkali-silica reactions are reviewed and illustrations of recent results are provided. It was possible to follow the kinetics of the chemical reaction between dissolved alkalis and opal in mortars by monitoring the rate at which alkalis are removed from the pore solutions of reacting mortars. Studies of the expansion behavior of synthetic alkali silica gels under controlled conditions were carried out and show no obvious correlation to chemical composition. The alkali reaction in mortars was found to produce changes in the appearance of opal grains documentable by the use of a scanning electron microscope. DOE

N83-16439# Burns and Roe Industrial Services Corp., Paramus, N. J.
CRITIQUE OF CONCEPTUAL DESIGN FOR REMOVAL OF SODIUM FROM LIGNITE BY ION EXCHANGE Final Report
12 Feb. 1982 112 p
(Contract DE-AC18-81FC-10291)
(DE82-010789; DOE/FC-10291/T1) Avail: NTIS HC A06/MF A01

In general, it appears that the proposed process is technically feasible and can be translated into an operating plant that could perform reliably and without unusual operation difficulties. However, the proposed equipment selection would, we believe, be a severe maintenance burden and somewhat difficult to control. We refer specifically to the countercurrent ion exchange contractors and the coal distribution to the 20 required units. These major difficulties may be overcome by selection of a countercurrent decantation (CCD) or similar system, as proposed. Our cost estimates indicate that a CCD system would substantially reduce the capital cost for this section of the plant. Nevertheless, our capital cost estimate for the entire plant is approximately double that in the base case GFETC/UND report. Applying this increased capital cost to the UND estimate of annual operating expenses, the fixed charges would more than double, from $0.56/ton to $1.36/ton of feed lignite. DOE

N83-16440# Los Alamos Scientific Lab., N. Mex.
POLARONS IN POLYACETYLENE
Alan R. Bishop and David K. Campbell 1981 15 p refs Presented at the Conf. on Non-Linear Probl., Present and Future, Los Alamos, N. Mex., Mar. 1981
(Contract W-7405-eng-36)
(DE82-006106; LA-UR-81-3590; CONF-810385-5) Avail: NTIS HC A02/MF A01

Polyacetylene, (CH)/sub x/ was studied. Kink-like solutions in the trans isomer were emphasized. It is shown that the same theoretical models also predict polaron like solutions in both cis and trans (CH)/sub x/. The explicit form of these polarons, their relation to kinks, possible implications for experiment, and open questions are discussed. DOE

N83-16441# California Univ., Livermore. Lawrence Livermore Lab.
METALLIZATION OF SOME SIMPLE SYSTEMS
M. Ross and A. K. McMahan 1981 9 p refs Presented at the Intern. Symp. on the Phys. of Solids Under High Pressure, Bad

Honnef, West Germany, 10-14 Aug., 1981
(Contract W-7405-eng-48)
(DE82-005187; UCRL-86483; CONF-810828-7) Avail: NTIS HC A02/MF A01

The metallization of Xe, Ar, He, I2, H2, and N2 are discussed. New shock wave data on liquid hydrogen and deuterium predicted pressure above 3 Mbar for the appearance of a monatomic metal phase. It is expected that CsI becomes metallic near 0.8 Mbar. DOE

N83-16442# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
FY 1981 ANNUAL REPORT ON PHOTOCHEMISTRY
John S. Connolly Sep. 1982 23 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-000037; SERI/PR-233-1579) Avail: NTIS HC A02/MF A01

Photophysics and photochemistry of chlorophylls, porphyrins, and model systems for artificial photosynthesis; theoretical calculations of thermodynamic limits on optimal efficiencies of solar photoconversion processes; and exploratory organometallic photochemistry are discussed. Progress in each of these areas is briefly summarized. DOE

N83-16443# United Technologies Corp., South Windsor, Conn. Power Systems Div.
THE 300-Btu GAS-COMBUSTOR DEVELOPMENT PROGRAM, PHASE 2 Final Report
T. J. Gilmartin and J. R. Grant (Pratt and Whitney Aircraft, West Palm Beach, Fla.) Mar. 1982 170 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 985-3)
(DE82-904631; EPRI-AP-2221) Avail: NTIS HC A03/MF A01

The development of a gas turbine combustor capable of meeting NO/sub x/ requirements when operated on medium heating value (MHV) coal derived gas without the use of water injection was investigated. The objectives were to design, fabricate, and test several lean premix combustor configurations and demonstrate NO/sub x/ emissions of 15 ppMv (dry) or less at 1.27 atmospheres. Specific objectives were to improve ease of combustor fabrication and extend combustor operating range. Two basic combustors were evaluated. The configuration 4 combustor represents a simplified multipremix tube design while the configuration 5 design is a two stage combustor incorporating seven venturi type premix elements. Measured data included inlet and exit temperatures, pressures, and emissions of NO/sub x/, CO, CO2, O2, and total (unburned) hydrocarbons. It is shown that both combustors met the NO/sub x/ goal with concentrations of 14 ppM or less corrected. It is demonstrated that the configuration design has an acceptable combustion 5 efficiency/stability over the full range of simulated power levels. DOE

N83-16444# Massachusetts Inst. of Tech., Cambridge. Energy Lab.
DESIGN STRATEGY FOR THE COMBUSTION OF COAL-DERIVED LIQUID FUELS
J. M. Beer, M. T. Jacques, W. F. Farmayan, and J. D. Teare Aug. 1982 175 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1412-6)
(DE82-905496; EPRI-AP-2517) Avail: NTIS HC A08/MF A01

The amenability of SRC-2 coal derived liquid fuels to combustion process modification by air staging for NO/sub x/ and particulates emission control was investigated. Two experimental systems were used: (1) a laboratory laminar flow reactor for determining rates of evolution of fuel bound nitrogen from pyrolyzing arrays of 150 (SIGMA)m SRC-2 fuel droplets; and (2) a pilot plant scale furnace for determining the effects of combustion air staging, air preheat, quality of atomization and fuel type in the conversion of fuel nitrogen to NO/sub x/. It is shown that there is a significant potential for controlling NO/sub x/ and particulates emissions in coal derived liquid fuel flames by combustion modifications; NO/sub x/ emission levels were reduced from 550 ppM measured in fast mixing single stage flames to less than 100 ppM under optimized staged combustion conditions with particulates emission levels below 0.33 x 10(+2) lb010(6) Btu. The overall excess air is maintained at approximately 10%. DOE

N83-16445# Avco-Everett Research Lab., Mass.
VOLATILE PRODUCTION DURING PREIGNITION COAL HEATING Quarterly Progress Report, Oct. 1981 - Dec. 1981
Jan. 1982 13 p
(Contract DE-AC22-80PC-30291)
(DE82-011241; DOE/PC-30291/5) Avail: NTIS HC A02/MF A01

The relationship between volatile matter production from pulverized coal and flame stabilization in a boiler environment is defined. The behavior of pulverized coal under preignition heating conditions is determined and correlated with a detailed kinetic transport model. Design and fabrication of the experimental apparatus is complete. The entire flow, optics and diagnostic systems were installed in the test cell and are operational. DOE

N83-16446# Pennsylvania Univ., Philadelphia. Dept. of Chemistry.
INSTRUMENTAL METHODS OF ANALYSIS OF SULFUR COMPOUNDS IN SYNFUEL PROCESS STREAMS Quarterly Technical Progress Report, Oct. - Dec. 1981
Joseph Jordan, John Stahl, and Joseph Yakupkovic Jan. 1982 24 p refs
(Contract DE-FG22-81PC-40783)
(DE82-011559; DOE/PC-40783/T5) Avail: NTIS HC A02/MF A01

The reaction between thiosulfate and p-hydroxymercuribenzoate was investigated because it can interfer with the determination of HS(-) and the polysulfides by thermometric titration. The literature on the chemistry of the moieties S2O4(2-), S2O6(2-), S3O6(2-), S5O6(2-), S6O6(2-) is reviewed critically as the basis for analytical methods development. The various moieties exhibit salient differences in behavior related to sulfur chain length. Properties affected include precipitation, cleavage, and electron transfer reactivities, which may have analytical significance. DOE

N83-16447# Pacific Northwest Lab., Richland, Wash. Atmospheric Sciences Dept.
PRECIPITATION-SCAVENGING PATHWAYS AND MECHANISMS: A QUALITATIVE OVERVIEW
J. M. Hales Jan. 1982 37 p refs Presented at the Symp. on Acid Forming Emissions in Alberta and their Ecological Effects, Edmonton, Canada, 10 Mar. 1982
(Contract DE-AC06-76RL-01830)
(DE82-010738; PNL-SA-10120; CONF-820319-1) Avail: NTIS HC A03/MF A01

This paper provides a visualized overview of individual and composite mechanisms leading to the wet removal of pollution from the atmosphere. The subject is presented by disaggregating the composite scavenging process into several well-defined stages, which are examined individually to identify pertinent physical mechanisms. The paper concludes with a tabular summary of selected wet-removal models, which can be applied under appropriate circumstances for precipitation scavenging estimation and assessment. DOE

N83-16448# Oak Ridge National Lab., Tenn. Analytical Chemistry Div.
BATCH- AND COLUMN-EXTRACTION PROCEDURES FOR ORGANICS IN SOLID WASTES
M. P. Maskarinec and D. K. Brown 1982 20 p refs Presented at the ASTM D-34 Meeting, Orlando, Fla., 28 Jan. 1982 Sponsored in part by EPA
(Contract W-7405-eng-26)
(DE82-011523; CONF-820132-1) Avail: NTIS HC A02/MF A01

Because of the possibility of contamination of aquifers by solid waste leachates, it is important to develop laboratory extraction procedures which predict the dispersion of organic materials from landfills. The results of a study comparing five laboratory extraction

procedures with respect to the organic content of the extract are given. Nine solid wastes, representing a wide variety of matrices, were considered. The extraction procedures used were: the environmental protection administration extraction procedure, a distilled water extractant, a citrate buffer extractant, an extractant containing a sodium ion exchange resin, and an upward flow column extraction test. It may be concluded that the column procedure most aggressively extracted organics from the solid wastes. However, the chemical nature of the organic material in the solid waste determines which of the organic material in the solid waste determines which of the batch extraction procedures is most aggressive. DOE

N83-16449# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
SOOT AND RADIATION IN COMBUSTING BOUNDARY LAYERS Ph.D. Thesis
Richard Alan Beier Dec. 1981 116 p refs
(Contract W-7405-eng-48; Grant NB80-NAGE-6839)
(DE82-008596; LBL-14011) Avail: NTIS HC A06/MF A01

In most fires thermal radiation is the dominant mode of heat transfer. Carbon particles within the fire are responsible for most of this emitted radiation and hence warrant quantification. As a first step toward understanding thermal radiation in full scale fires, a laminar combusting boundary layer is studied. Carbon particulate volume fraction profiles and approximate particle size distributions are experimentally determined in both free and forced flow for several hydrocarbon fuels and PMMA (polymethylmethacrylate). A multiwavelength laser transmission technique determines a most probable radius and a total particle concentration which are two unknown parameters in an assumed Gauss size distribution. A sooting region is observed on the fuel rich side of the main reaction zone. For free flow, all the flames are in air, but the free stream ambient oxygen mass fraction is a variable in forced flow. DOE

N83-16450# Illinois Univ., Urbana. Dept. of Physics.
PROBING THE SURFACE OF A HETEROGENEOUS CATALYST: DOUBLE RESONANCE OF CARBON MONOXIDE CHEMISORBED ON HIGHLY DISPERSED PLATINUM Ph.D. Thesis
Claus Dieter Makowka 1982 154 p refs
(Contract DE-AC02-76ER-01198)
(DE82-011958; DOE/ER-01198-1376) Avail: NTIS HC A08/MF A01

Spin echo double resonance (SEDOR) is observed at 77 K for small Pt particles on which 13CO was chemisorbed. The samples are Pt supported on eta-alumina with Pt dispersions (fraction of the atoms that are on the surface) of 26% and 76%. After cleaning, the samples are exposed to CO enriched to 90% 13C. The 13C NMR is observed indirectly through its effect on the 195Pt spin echo. The SEDOR allows the NMR observation of the surface 195Pt nuclei underneath the resonance of the nonsurface nuclei from which the surface nuclei are ordinarily unresolved. The position and width of the 195Pt SEDOR signal confirms a peak in the 195Pt NMR line shapes to the surface layer of platinum atoms. No surface nuclei are detected at any other locations in the 195Pt NMR line shape. DOE

N83-16451# California Univ., Livermore. Lawrence Livermore Lab.
DEVELOPMENT OF ADVANCED TECHNOLOGIES FOR PHOTOCHEMICAL TRITIUM RECOVERY Biquarterly Progress Report, 1 Jul. - 31 Dec. 1981
F. T. Aldridge, I. P. Herman, F. Magnotta, and J. B. Marling 3 Feb. 1982 20 p refs
(Contract W-7405-eng-48)
(DE82-011159; UCID-18509-81-3-4) Avail: NTIS HC A02/MF A01

The photochemical processes used in tritium recovery by isotopically selective infrared laser multiple photon dissociation of chloroform was characterized. Experimental assessment of 12 micron lasers for tritium separation continued, the apparatus for performing T/D laser enrichment measurements was constructed, and progress was made in the overall process analysis. DOE

N83-16452# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Bereich Neue Technologien.
APPLICATION OF MODERN SURFACE ANALYTICAL METHODS FOR THE SOLUTION OF PROBLEMS OF TECHNICAL CATALYSTS Final Report, Dec. 1980
Eilert Hamer, Otto Inacker, Carsten Plog, and Max Seidl Bonn Bundesministerium fuer Forschung und Technologie Sep. 1982 132 p refs In GERMAN; ENGLISH summary
(Contract BMVG-01VM349-ZK/NT/NTS2036)
(BMFT-FB-T-82-161; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27,70

A procedure based on surface analytical methods was elaborated for the development of technical heterogeneous catalysts, using the reduction of NO by CO on CuO catalysts as a model reaction. It was applied to promote iron catalysts for ammonia synthesis. Correlations between reaction kinetic data and surface properties of the catalysts were found, providing information about the type and quantity of active sites and the optimization of catalysts. Author (ESA)

N83-16453# National Bureau of Standards, Washington, D.C.
THERMOPHYSICAL PROPERTIES OF PROPANE FROM 85 TO 700 K AT PRESSURES TO 70 MPa Final Report
Robert D. Goodwin and William M. Haynes Apr. 1982 252 p refs
(PB82-252040; NBS-MONO-170; LC-82-600514) Avail: NTIS HC A12/MF A01 CSCL 07D

Thermophysical properties of propane are tabulated at integral temperatures over the entire range of fluid states from 85 to 700 K along isobars to 70 MPa by using a modified form of the nonanalytic equation of state. These tables, along with a table for the saturated liquid, include values for density, compressibility factor, internal energy, enthalpy, entropy, heat capacities, fugacity, sound velocity, dielectric constant, and isochore and isotherm derivatives. In addition to the equation of state, equations are presented for vapor pressures, orthobaric vapor and liquid densities, ideal gas properties, virial coefficients, dielectric constants, heats of vaporization, melting pressures, and orthobaric liquid specific heats, enthalpies, and entropies. GRA

N83-16454# California Univ., Riverside. Statewide Air Pollution Research Center.
EXPERIMENTAL PROTOCOL FOR DETERMINING HYDROXYL RADICAL REACTION RATE CONSTANTS Final Report
J. N. Pitts, Jr., A. M. Winer, S. M. Aschmann, W. P. L. Carter, and R. Atkinson Apr. 1982 46 p refs
(Grant EPA-R-806661)
(PB82-256066; EPA-600/3-82-038) Avail: NTIS HC A03/MF A01 CSCL 07D

An experimental protocol for the determination of rate constants for the reactions of the hydroxyl (OH) radical with chemicals in the gas phase at room temperature has been developed and is described in detail. This protocol will thus provide a basis for evaluating the relative importance of one atmospheric reaction pathway (i.e., attack by the OH radical) of organic substances which may be emitted into the environment. Author (GRA)

N83-16455# Schering A.G., Bergkamen (West Germany). Technical Process Div.
CONSTRUCTION AND OPERATION OF A FISCHER-TROPSCH LABORATORY SYSTEM WITH A LIQUID PHASE REACTOR
H. J. Hubert Jul. 1982 164 p Transl. into ENGLISH of a German mono., Jul. 1980 Sponsored in part by Bundesministerum fuer Forschung und Technologie, Bonn
(PB82-259011; BMFT-FB-T-80-033) Avail: NTIS HC A08/MF A01 CSCL 07D

Among the products of the Fischer-Tropsch reactions, the olefins in the range C2 to C4 are important raw materials for the chemical industry. This report describes an effort to use new catalysts and to vary the reaction conditions so as to increase the yield of C2/C4 olefins. The reaction took place in liquid phase reactors of various size and in small fixed bed reactors. The melt

catalysts of Sasol Company and the precipitation catalysts of Ruhchemie Company, as well as iron whisker catalysts were tested. By means of the new catalysts, yields of C2/C4 olefins could be increased from a previous value of less than 40 g to more than 60 g per cu m (V(n) hydrogen and carbon monoxide. GRA

N83-16456# Tsukuba Univ. (Japan). Inst. of Electronics and Information Science.
COMPUTER COMPENSATION FOR NMR QUANTITATIVE ANALYSIS OF TRACE COMPONENTS
Takashi Nakayama and Yuzuru Fujiwara 22 Jul. 1981 25 p refs (PB82-259474; ISE-TR-81-24) Avail: NTIS HC A02/MF A01 CSCL 07D

A computer program was written that determines trace components and separates overlapping components in multicomponent NMR spectra. This program uses the Lorentzian curve as a theoretical curve of NMR spectra. The coefficients of the Lorentzian are determined by the method of least squares. Systematic errors such as baseline/phase distortion are compensated and random errors are smoothed by taking moving averages, so that there processes contribute substantially to decreasing the accumulation time of spectra data. The accuracy of quantitative analysis of trace components has been improved by two significant figures. This program was applied to determining the abundance of 13C and the saponification degree of PVA. GRA

N83-16457# Tsukuba Univ. (Japan). Inst. of Information Science and Electronics.
LEARNING SYSTEM FOR AUTOMATIC STRUCTURE ANALYSIS OF MASS SPECTRA
Takashi Nakayama and Yuzuru Fujiwara 1 Apr. 1981 27 p refs (PB82-259516; ISE-TR-81-25) Avail: NTIS HC A03/MF A01 CSCL 07D

A computer-assisted mass spectral interpretation system which has the capability of learning is described. The set of correspondences between substructure and spectral component (CSSC) is used for interpreting mass spectra. CSSC is generated, renewed and improved automatically in the system. This automatic generation is learning. Chemical structures are represented in terms of blocks. GRA

N83-16458# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Mechanical and Aerospace Engineering.
FLAME SPREAD AND SPREAD LIMITS Final Report
Robert A. Borgeson Jul. 1982 59 p refs
(Contract NB80-NADA-1017)
(PB82-258724; NBS-GCR-82-396) Avail: NTIS HC A04/MF A01 CSCL 13L

The computer model of Frey and T'ien (1979) has been extended to study the effects of the initial bulk fuel temperature and an inert additive. The theory assumes a thermally thin solid in an opposed flow with negligible forward heat conduction in the fuel. Raising the initial fuel temperature was found to increase the flame spread rate by augmenting the fuel mass flux in the forward part of the pyrolysis zone. As the initial fuel temperature increases, the limiting value of the Damkohler number for extinction decreases. An inert additive reduces the spread rate by lowering the flame temperature and wasting energy in the inert pyrolysis. GRA

N83-16459# Imhausen-Chemie G.m.b.H., Lahr (West Germany).
OPTIMIZING THE COMBINATION OF A FISCHER-TROPSCH SYNTHESIS WITH COAL HYDROGENATION FOR THE PRODUCTION OF MOTOR FUELS
Karl-Heinz Imhausen, Norbert Heger, Karl-Heinz Eisenlohr, Friedrich Schnur, Franz Stratz, Artur Vinke, Hans Gaensslen, Hans Teggers, Uwe Lenz, and Dieter Kirchhof Aug. 1982 34 p Transl. into ENGLISH of the mono. "Optimierung der Kombination einer Fischer-Tropsch-Synthese mit einer Kohlehydrierung zum Zwecke der Produktion von Motorkraftstoffen" West Germany, 26 Jul. 1982 Sponsored in part by Bundesministerium fuer Forschung und Technologie
(PB82-255167; BMFT-FB-T-80-048) Avail: NTIS HC A03/MF A01 CSCL 07A

The most favorable combination of coal hydrogenation, synthesis gas production and Fischer-Tropsch synthesis for the production of (spark ignition and diesel) motor fuels and liquefied gas from lignite and from bituminous coal with or without the simultaneous production of mains gas is discussed. It was found that, for lignite, high pressure hydrogenation had the lowest capital cost of all the processes investigated, yielded motor fuels conforming to specifications and had a high thermal efficiency. For bituminous coal only a combination of high pressure hydrogenation and Fischer-Tropsch synthesis led to specification products. In both cases a combined production of motor fuels, liquefied gas and mains gas could be economically attractive if a market for mains gas exists or can be developed and if the net financial return for the mains gas covers the production costs. GRA

N83-16460# North Carolina State Univ., Raleigh. Dept. of Chemical Engineering.
RATES AND EQUILIBRIA OF DEVOLATILIZATION AND TRACE ELEMENT EVOLUTION IN COAL PYROLYSIS Final Report, Sep. 1977 - Jun. 1981
R. M. Felder, C.-C. Kau, J. K. Ferrell, and S. Ganesan Apr. 1982 103 p refs
(Contract EPA-CR-804811)
(PB82-260944; EPA-600/7-82-027) Avail: NTIS HC A06/MF A01 CSCL 07D

A laminar flow furnace was used to study the kinetics of devolatilization and evolution of S, As, Pb, and Hg in the pyrolysis of pulverized coal in nitrogen. Variables included pyrolysis time, reactor temperature, and coal type. Devolatilization rates and weight losses of the two subbituminous coals tested were lower than those of a bituminous coal. The four elements were released in significant quantities during rapid pyrolysis, with the elemental loss from the bituminous coal proceeding more rapidly and to a greater extent than that from the subbituminous coals. Emissions of As and Pb in subbituminous coal and Pb in bituminous coal were found to be proportional to the total volatile matter released. Emissions of Hg and As in bituminous coal were porportionately greater than the total volatile matter released. GRA

N83-16461# Little (Arthur D.), Inc., Cambridge, Mass.
IGNITION SOURCES OF LNG VAPOR CLOUDS Final Report, Aug. 1980 - Nov. 1981
D. J. Jeffreys, N. A. Moussa, R. N. Caron, and D. S. Allan Jan. 1982 132 p refs Sponsored by GRI
(PB82-262577; GRI-80/0108; Rept-85279) Avail: NTIS HC A07/MF A01 CSCL 13B

A data base was developed for ignition sources of LNG vapor clouds in urban areas. A literature survey and field surveys of an urban are and of an LNG plant were conducted. Over 150 potential ignition sources were identified. The main source characteristics affecting ignition were analyzed, covering source density, accessibility to a vapor cloud, probability of activation during cloud exposure and ignition potential. Ignition tests were conducted on cigarettes, car lighters, automotive electrical systems and traffic light relays in a 7% methane/air mixture. Methodologies were developed to translate the results of test and analyses into quantitative ignition probabilities. Sample probability values were estimated for selected sources. GRA

N83-17363*# Tennessee Univ. Space Inst., Tullahoma. Dept. of Engineering Science and Mechanics.
INSTABILITY OF A SOLIDIFYING BINARY MIXTURE
Basil N. Antar *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 13 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 07D

N83-17388*# Alabama Univ., Huntsville. Dept. of Chemistry.
PRODUCTION OF METAL PARTICLES AND CLUSTERS
Samuel P. McManus *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 11 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 07D

N83-17402*# Calhoun Community Coll., Decatur, Ala. Dept. of Natural Sciences.
STUDIES WITH SAMPLE CONDUCTIVITY, INSERTION RATES, AND PARTICLE DEFLECTION IN A CONTINUOUS FLOW ELECTROPHORESIS SYSTEM
George Williams, Jr. *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 25 p refs (For primary document see N83-17359 07-80) Avail: NTIS HC A99/MF A01 CSCL 07D

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N83-16462# Central Electricity Generating Board, London (England).
INVESTIGATION INTO THE DEPENDENCE OF THE BRITTLE FRACTURE TRANSITION TEMPERATURE SHIFT ON THE IRRADIATION TEMPERATURE FOR SOME REACTOR PRESSURE VESSEL STEELS WITH DIFFERENT COPPER CONTENT
J. Ahlf and F. J. Schmitt 1982 15 p refs Transl. into ENGLISH from J. Nucl. Mater. (Amsterdam), v. 105, 1982 p 48-55
(BLL-CE-Trans-7871-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

Irradiation tests on three steel heats with different Cu content in the temperature range between 255 C and 310 C up to a fast neutron dose of 1.7 x 10 to the 19th/sq cm (E > 1 MeV) are described. Author

N83-16463# Central Electricity Generating Board, London (England). Translations Section.
HEAT TREATMENT AND PROPERTIES OF THICK-WALLED COMPONENTS MADE OF HIGH TEMPERATURE TUBE STEELS
G. Kalwa and E. Schnabel [1982] 21 p refs Transl. into ENGLISH from VGB Kraftwerkstech. (West Germany), v. 58, no. 8, 1978 p 604-613
(BLL-CE-Trans-7696-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The effect of the rate of cooling on the structure and the mechanical properties of the most important high temperature tube steels was investigated. Particular emphasis was placed on the range of very slow cooling rates as used for air tempering of thick walled tubes. The study covered steels 15 Mo3, 13 CrMo44, 10 CrMo9 10, 14 MoV63, WB 36 and X20 CrMoV12 1 and also the high temperature steel 20 MnMoNi55. To obtain good weldability and toughness, variants having a lower carbon content are of interest. For this reason, an investigation was carried out on four test melts based on 20 MnMoNi55 of the effect on the mechanical properties and the transformation behavior of reducing the carbon content. Author

N83-16464# Central Electricity Generating Board, London (England). Translations Section.
CHARACTERISTICS OF X 20 CrMo V 12 1 STEEL
H. Fabritius and H. Weber [1982] 30 p refs Transl. into ENGLISH from Rev. Metal CENIM (France), v. 15, no. 2, Mar. - Apr. 1979 p 123-137
(BLL-CE-Trans-7698-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The analysis of the mechanical and physical properties, and the structural transformations, of X 20 CrMo V 12 1 steel when subjected to various heat treatments are described. The toughness, resistance and the effect of the soaking time at high temperatures, and practical advice is given for welding. From these analyses the necessary conclusions are drawn for the suitable use of the steel, its range of application is indicated and is compared with that of other steels. Author

N83-16465# Central Electricity Generating Board, London (England). Translations Section.
ON THE INFLUENCE OF THE ALLOYING ELEMENTS ON THE TRANSFORMATION AND PRECIPITATION PROCESSES DURING COOLING OF CREEP-RESISTANT TUBE STEELS AFTER AUSTENITIZING. 1: CHROMIUM MOLYBDENUM STEELS
Ruth Petri, Ekkehard Schnabel, and Paul Schwaab 27 Oct. 1982 14 p refs Transl. into ENGLISH from Arch. Eisenhuettenw. (West Germany), v. 51, no. 8, 1980 p 355-360
(BLL-CE-Trans-7686-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The transformation and precipitation behavior of chromium and molybdenum alloyed tube steels and some experimental casts was studied. The results are presented in time/temperature diagrams. The influence of the alloying elements carbon, chromium, and molybdenum on the position of the transformation ranges and the type of the precipitated phases is considered. Author

N83-16466# Central Electricity Generating Board, London (England). Translations Section.
STRAIN-INDUCED STRESS CORROSION CRACKING IN STEELS IN LIQUID METALS
W. Friehe [1982] 19 p refs Transl. into ENGLISH from Werkst. Korros. (West Germany), v. 29, 1978 p 747-753
(BLL-CE-Trans-7685-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

Intercrystalline cracks in steels may be caused by corrosion from liquid metals (LME = liquid metal embrittlement) as well as by electrolytes. They were observed on both stainless chrome and chrome nickel steels and on low alloy or unalloyed steels. Structural components under tensile stress are particularly at risk, for example during brazing and hot dip galvanizing. Considerable safety hazards and economic losses are connected with cracks forming in steel melting vats used for lead refining and galvanizing since large quantities of liquid metal may flow out. A working hypothesis for crack development is discussed. The liquid metals and steels seem to provide no possibilities for preventing LME damages. Lower critical limit values for tensile stress and strain rate are to be determined by means of special investigations; these values may form a basis for establishing design and operating characteristics which will enable designers and plant operators to prevent LME cracks from forming. Author

N83-16467# Central Electricity Generating Board, London (England). Translations Section.
DETERMINATION OF THE INTERACTION ENERGY BETWEEN THE INTERSTITIAL ATOMS AND DISLOCATIONS IN TITANIUM ALLOYS
V. M. Beletskii 27 Oct. 1982 6 p refs Transl. into ENGLISH from Metalloved. Term. Obrab. Metal. (USSR), no. 1, 1980 p 52-53
(BLL-CE-Trans-7773-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

Investigations into the temperature and amplitude relationship of the internal friction in commercially pure WTi 1-0 type titanium and WTi22 type titanium alloy are described. Rectangular test pieces measuring 1 x 1 x 100 mm were cut for the investigations. The internal friction was measured on a specially manufactured reversible pendulum type device using the continuous oscillation method. The curves were recorded with a H-359 type two-coordinate d.c. milliammeter with the device operating under forced undamped oscillation conditions. Author

N83-16468# Central Electricity Generating Board, London (England). Translations Section.
CORROSION FATIGUE
R. M. Pelloux [1982] 19 p refs Transl. into ENGLISH of conf. paper presented at the Conf. on Fatigue of Mater. and Struct. (Canada), 1978 p 8-26 Conf. held in Sherbrooke, Canada, Jul. 1978
(BLL-CE-Trans-7677-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

Corrosion fatigue is discussed as a highly complex phenomenon. Cracks initiated in corrosion fatigue are clearly associated with slip activity close to the surface resulting from local dissolution

of the metal. Hydrogen embrittlement on the surface is included in the effects of moist environment on crack initiation in steels. The rate of cracking in a corrosive environment depends to a large extent on the frequency and shape of the stress cycle. Corrosion reactions at the crack tip are not properly understood although synergistic interaction between corrosion and fatigue is clearly the result of exposure in the corrosive environment of fresh metal surfaces during opening of the crack. The CTOD represents the upper limit of the rate of cracking by corrosion fatigue below K sub ISCC. Above K sub ISCC the effects of the corrosion rate controls the rate of growth of the crack in each cycle. S.L.

N83-16469# Central Electricity Generating Board, London (England). Translations Section.
THE EFFECT OF NITROGEN, PHOSPHOROUS AND NICKEL ON THE CORROSION CRACKING BEHAVIOUR AND THE STACKING FAULT ENERGY OF AUSTENITIC CHROMIUM-NICKEL ALLOYS
V. I. Gerasimov [1982] 14 p refs Transl. into ENGLISH from Zashchita Metallov (USSR), v. 13, no. 6, 1977 p 662-667
(BLL-CE-Trans-7676-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The connection between the corrosion cracking behavior of austenitic chromium nickel alloys, their chemical composition, and dislocation arrangement is examined. As the stacking fault energy increases, the stress corrosion resistance of the materials being examined is shown to increase. Author

N83-16470# Central Electricity Generating Board, London (England). Translations Section.
EVALUATION OF DETERIORATION DUE TO HOT CREEP IN CHROME-MOLYBDENUM FERRITIC STEELS USED IN THERMAL POWER STATIONS
C. Castani, M. Livraghi, and V. Regis [1982] 25 p Transl. into ENGLISH from La Met. Ital. (Italy), no. 9, 1976 p 425-433
(BLL-CE-Trans-7669-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The long term deterioration due to hot creep in metallic materials used at high temperatures in thermal power stations is investigated. The checking of the state of the tubes which convey the steam from the boiler to the turbine is of fundamental importance, both as regards safety and for calculations to predict the operating life of the plants. The design calculations, nondestructive tests on plant, and destructive tests on materials which were in service are verified. The validity of certain methodologies are checked. The results of destructive tests carried out on two lengths of type 1 Cr 1/2 Mo ferritic steel taken on the steam line of a 65MW thermal unit are presented. S.L.

N83-16471# British Library Lending Div., Boston Spa (England).
SOLUTE INTERNAL FRICTION PEAKS IN Fe-As AND Fe-S ALLOYS
M. A. Shumilov, L. V. Matvienko, V. I. Bondar, and K. N. Sokolov 2 Dec. 1982 5 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Metall. (USSR), no. 10, 1981 p 83-86
(BLL-M-26799-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The reason for the presence of a solute peak in Fe-As and Fe-S alloys was studied. Grain boundary solute peaks were observed on curves tracing the temperature dependence of internal friction in alloys of iron with phosphorus, silicon, chromium, molybdenum, titanium, with a body centered cubic lattice. It is noted that these peaks are not observed in pure metals and single crystals. E.A.K.

N83-16472# British Library Lending Div., Boston Spa (England).
THE STRUCTURE OF LIQUID ALLOYS AND THEIR MANUFACTURING PROCESS
B. A. Baum, E. A. Klimenkov, G. S. Tyagunov, and V. B. Mikhailov 2 Dec. 1982 11 p refs Transl. into ENGLISH from Stal (USSR), no. 10, 1981 p 23-27
(BLL-M-26780-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The theory of simple liquids is discussed as well as the importance of considering specific factors in constructing models of liquid structures. The nature of nonsimple liquids such as steel melts is described and it is shown that the most adequate model for describing liquid structure is that of the microheterogeneous cybotaxial structure of the liquid. This enables the genetic link between the melt and the corresponding solid state to be revealed. The essence of such models is examined and the main reasons for the nonequilibrium of real solutions are explained. A joint analysis of the structure and properties of steels in the liquid and solid states leads to the development of steelmaking processes based on optimum practices in relation to temperature and time. Author

N83-16473# Electricity Council, London (England).
CONTINUOUS THERMAL TREATMENT BY THE HOWAQ PROCESS OF COLD-LAMINATED SHEET METAL
Ph. Paulus and M. Economopoulos Oct. 1982 21 p refs Transl. into ENGLISH from Rev. de Met. (France), Feb. 1979 p 89-97
(BLL-OA-Trans-1932-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

In the HOWAQ process, cooling of sheet metal is effected by immersion in water at a temperature between 90 and 100 C. The temperature is automatically regulated because operation takes place at the boiling temperature of the quenching fluid. Since all the heat to be extracted serves to vaporize the water, the recycling system is composed mainly of a condenser and operates in a closed circuit. Homogeneity can be assessed by observing the variation in mechanical properties as a function of the metal sheet, and by examining the flatness after quenching. The efficiency of the method compared to air cooling and a still cold water bath is discussed. The surface states of metal sheets after HOWAQ treatment are examined and metallurgical results for high resistance steels and for mild steels for stamping are presented. The process is economical due to low investment costs, alloy costs, and energy savings. A.R.H.

N83-16474# Electricity Council, London (England). Overseas Relations Branch.
CONTINUOUS ANNEALING DEVICE FOR METAL WIRE
Pierre Ravret Oct. 1982 7 p Transl. into ENGLISH from French Patent no. 76-08786 (25 Mar. 1976) 7 p
(BLL-OA-Trans-1879-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

Fine, fragile wire, such as that made of aluminum, can be automatically annealed using a device of the transformer type with short circuited conducting coil. Around the magnetic circuit there are arranged, in addition to the primary coil, two conducting coils located in the same plane and free to rotate on an air cushion. These two coils, made of a stainless material, are fixed by means of elastic rings on two rigid rims made of an insulating material, each carrying two inclined side plates. Each rim is arranged with clearance between two rings of conical surface bearing against each other by means of a hermetic seal between which air is introduced under pressure. A.R.H.

N83-16475# Electricity Council, London (England). Overseas Relations Branch.
AQUEOUS AMMONIACAL ETCHING SOLUTION FOR ETCHING COPPER AND COPPER ALLOYS
Efthimios Konstantouros and Relindis Bienwald Oct. 1982 13 p Transl. into ENGLISH from German Patent no. 26-25-869 (9 Jun. 1976) 13 p
(BLL-OA-Trans-1916-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

Galvanized printed wiring boards with Sn, SnPb, or Ni/Au surfaces are etched using a solution containing ammonia and ammonium carbonate as well as tetramine copper(11) ions and ammonium chloride with the following per litre of solution: 2.0 mol to 2.75 mol cupric ions; 8.4 mol to 12.2 mol ammonia, total; 4.0 mol to 6.5 mol chloride ions; and 0.2 mol to 1.0 mol carbonate ions. To maintain the concentration of cupric ions, a portion of the solution is removed and replaced with a makeup solution

containing 215 g/l to 335 g/l ammonium chloride; 20 g/l to 80 g/l ammonium carbonate; and 300 m/l to 415 m/l conc. ammonia. A.R.H.

N83-16476# British Library Lending Div., Boston Spa (England).
PERFORMANCE OF CONTROL AT THE INITIAL MOMENT OF HEATING A PLATE WITH LIMITATIONS ON THE THERMAL STRESSES
A. G. Lyubin 2 Dec. 1982 7 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Metall. (USSR), no. 10, 1981 p 129-132
(BLL-M-26083-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The controlling functions in the initial moment of heating a homogeneous plate of finite length with limitations on the thermal stresses were analyzed. The results obtained can be used in calculating devices for regulating thermal processes in metallurgy. Author

N83-16477# Electricity Council, London (England).
CORROSION OF IRON IN SULPHURIC ACID SOLUTION PRODUCED BY AN ALTERNATING CURRENT. PART 2: STUDIES ON ALTERNATING CURRENT CORROSION OF IRON
Y. Torigoe 9 Nov. 1982 14 p refs Transl. into ENGLISH from Denki Kagaku (Japan), v. 45, 1977 p 518-522
(BLL-OA-Trans-1811-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

The influence of an a.c. current on the corrosion of iron in aqueous sulphuric acid was examined in detail for the case of a.c. polarization and the simultaneous occurrence of a.c. and d.c. polarization, on the basis of the polarization characteristics and of experimental results relating to the reaction rate. Author

N83-16478# Electricity Council, London (England).
ON SOME CHARACTERISTICS OF THE ELECTRODEPOSITION OF METALS IN CONDITIONS OF THE ADSORPTION OF SURFACE ACTIVE SUBSTANCES
M. A. Loshkarev and Yu. M. Loshkarev 9 Nov. 1982 15 p refs Transl. into ENGLISH from Ukr. Khim. Zh. (USSR), v. 43, no. 11, 1977 p 1146-1152
(BLL-OA-Trans-1800-(6196.3)) Avail: British Library Lending Div., Boston, Spa, Engl.

The electrodeposition of metals in conditions of the adsorption of surface active substances is reviewed. Author

N83-16479# Electricity Council, London (England). Overseas Relations Branch.
A PROCESS FOR ETCHING OF COPPER IN A BASIC ETCHING SOLUTION
Hans Skilandat, Hans Loewe, Hans-Juergen Jaeger, and Wolfgang Naeser Oct. 1982 24 p Transl. into ENGLISH from German Patent no. 126096 (27 May 1976) 24 p
(BLL-OA-Trans-1915-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

A process for etching copper in a basic etching solution is disclosed which is suitable for manufacturing two-level and multiple level printed wiring boards, as well as for other metal removal purposes. Continuous processing is achieved at a roughly constant etching rate when a partially used, copper-enriched etching solution is regenerated by running off a certain quantity of spent etching liquor and adding an equal volume of the initial etching solution. The variations of the etching rate are smaller for smaller difference between the copper concentration of the spent etching liquor and the copper concentration of the regenerated solution. The initial solution contains ClO2 (-), NH3, and NH4(+) preferably in the molar ratio 1:4:4. A.R.H.

N83-16480# Electricity Council, London (England). Overseas Relations Branch.
ELECTRODEPOSITION OF COPPER, NICKEL AND CHROMIUM
W. Metzger, R. Ott, and G. Pappe Oct. 1982 20 p refs Transl. into ENGLISH from Jahrbuch er Oberflaechentech. (West Germany), v. 34, 1978 p 69-80
(BLL-OA-Trans-1931-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

The use of cationic polyacrylamide to promote the formation of soft copper coatings; various smoothers (including acidic fluoroborate) for nickel and copper baths; diffusion governed polarization; the deposition of decorative brass coatings on shaped parts; and the use of Rochelle salt to improve anode solubility in copper plating, galvanizing, and the production of brass coatings are discussed. The advantages of using nickel-iron alloy baths instead of pure bright nickel are considered as well as the reproducibility of various methods for determining the porosity of electrodeposits. Physical properties to be obtained by using additives in the baths for nickel deposition are listed. Hydrogen diffusion measurement, cost reduction, the deposition of chromium on a silicon diffusion layer, the diffusion treatment of chromium and paladium for corrosion prevention, and difficulties encountered in the chromium plating of screws, nuts and similar mass produced articles are examined. A.R.H.

N83-16481# Electricity Council, London (England).
PROPERTIES OF THE CuCl SURFACE LAYER IN THE ETCHING OF COPPER
H. Herz, J. L. Jostan, and W. Mussinger Oct. 1982 7 p refs Transl. into ENGLISH from Galvanotech. (West Germany), v. 66, no. 10, 1975 p 800-802
(BLL-OA-Trans-1890-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

The formation of layers of variable color on the surface of copper though generally found to be an obstacle in the etching process, can have certain advantages, deriving from the poor solubility of the CuCl and its sensitivity to light. The surface layer of CuCl on copper, the CuCl formation, the edge protection effects, and the light sensitivity are studied. S.L.

N83-16482# Electricity Council, London (England).
TECHNIQUES OF TEMPERATURE MEASUREMENT AND THEIR IMPORTANCE IN ALUMINIUM FOUNDRIES
J. Langerweger Oct. 1982 25 p refs Transl. into ENGLISH from Rev. Suisse Aluminium (Switzerland), v. 24, no. 10, 1974 p 302-312
(BLL-OA-Trans-1881-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

A skilled foundryman can estimate the temperature of a molten metal in the crucible to a certain extent. In the case of aluminum, the thickness of the oxide film on the liquid metal and the type of alloy, together with prevailing lighting conditions can cause errors up to + or - 100 C. The measurement by eye in metal casting molds or heat treatment furnaces is even more uncertain. Efforts to develop special heating and cooling systems with automatic temperature control for the molds in pressure casting are discussed. The effects of temperature on the properties of the molten metals and castings are also considered. A.R.H.

N83-16483# Electricity Council, London (England).
SOME METALLURGICAL ASPECTS OF STATIC AND CONTINUOUS HEAT TREATMENTS OF ALUMINUM OR ALUMINUM ALLOY WIRE
C. Drapier 9 Nov. 1982 19 p refs Transl. into ENGLISH from Rev. Alumin. (France), no. 472, Apr. 1978 p 201-208
(BLL-OA-Trans-1920-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

The study of heat treatment of a supersaturated cold drawn alloy by means of a temperature treatment time (TTT) diagram makes it possible to identify the respective ranges for softening and precipitation and to determine whether the static and continuous processes produce the same structural development. In the case of aluminum alloys produced for electrical conductors, the precipitation phenomena can occur at the same time as the softening process. An experiment is described which shows that when applying final heat treatment to a highly worked Al alloy, it is possible to obtain partially recrystallized states in which the values obtained are a function of the temperature and time conditions of the process used. Static treatments at a temperature

below 350 C and lasting more than 15 minutes yield better mechanical and electrical properties than continuous treatment at a temperature of at least 500 C and lasting less than 1 sec. The TTT diagrams are given for A5/L, Al-Fe, and Al-Fe-Mg wire.
A.R.H.

N83-16484# Electricity Council, London (England).
OXIDATION OF COPPER (1) AND IRON (2) IONS AT HIGH ANODE POTENTIALS IN CONCENTRATED CHLORIDE SOLUTIONS
Yu. I. Naumov et al Oct. 1982 9 p refs Transl. into ENGLISH from Zh. Prikl. Khim. (USSR), v. 51, no. 8, 1978 p 1864-1867
(BLL-OA-Trans-1936-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

The kinetics of the processes of anodic oxidation of copper (1) and iron (2) ions in concentrated copper-chloride (C-Cl) and iron-chloride (I-Cl) solutions are investigated. Partially exhausted etching solutions, in the range of potentials where chlorine is evolved are simulated.
S.L.

N83-16485# Electricity Council, London (England).
ELECTRICAL EQUIPMENT FOR ANNEALING BRASS AND COPPER STRIP
J. Morel, R. Thomassin, and C. Vidal 9 Nov. 1982 29 p Transl. into ENGLISH of J. d'Inform. Electro-Ind. de la Reg. Parisienne (Versailles), 19-20 Oct. 1977 22 p Presented at the Comite Franc. d'Electrothermie, Versailles, 19-20 Oct. 1977 22 p
(BLL-OA-Trans-1909-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

By analyzing the operation of heat treatment furnaces and measuring their energy consumption, it is possible to compare the different thermal efficiencies and determine the influence of the service conditions of the furnaces on the energy consumption. An electric furnace, muffled and ventilated; and electric furnace, unmuffled and unventilated; and a bell type electric furnace with controlled atmosphere are considered.
A.R.H.

N83-16486# Defence Research Information Centre, Orpington (England).
THE EFFECT OF HIGH RATES OF COOLING ON THE STRUCTURE OF ALUMINIUM-GERMANIUM AND GERMANIUM-TIN ALLOYS
I. V. Salli and A. K. Kushnereva 19 Jan. 1983 11 p refs Transl. into ENGLISH from Metallofiz. (USSR), v. 27, 1970 p 189-194
(DRIC-Trans-6743; BR85869) Avail: NTIS HC A02/MF A01

Investigations of the structures of alloys crystallized at high rates revealed the following phenomena: metastable expansion in the solid solution, the formation of metastable phases which are absent in the equilibrium phase diagram, and the formation of amorphous phases which could form the basis of a new area of metallophysics and metallography. Two eutectics of germanium cooled at a rate of one million degrees centrigrade per second are examined.
Author

N83-16487# United Kingdom Atomic Energy Authority, Risley (England).
INFLUENCE OF FREQUENCY ON THE CRACK GROWTH BEHAVIOUR OF STEEL 22 NiMoCr 37
Gerscha and Munster [1980] 25 p ref Transl. into ENGLISH of "Frequenzeinfluss auf das Risswachstumsverhalten des Stahles 22 NiMoCr 3 7" rept. KWU/R-413/8/80 KWU Lab., West Germany, 29 Jan. 1980 20 p
(KWU/R-413/8/80) Avail: NTIS HC A02/MF A01

Crack growth tests at room temperature and 300 C and different stress ratios were carried out in the frequency range from 350 to 0.03 Hz on 22 NiMoCr 37 (base metal). The experiments show that the investigation frequency, stress ratio, and test temperature do not influence the slope of the crack growth curve but only change the size of C sub o of the crack growth law. C sub o becomes greater with a falling frequency, rising temperature, and higher stress ratio. The maximum difference consists in approximately a factor of 10.
Author

N83-16488# British Library Lending Div., Boston Spa (England).
CONSUMPTION OF BUTYNEDIOL IN BRIGHT NICKEL PLATING
Saburo Konishi, Masayuki Yokoi, and Tatsuro Ichimura [1982] 14 p refs Transl. into ENGLISH from Kinzoku Kyomen Gijutsu (Japan), v. 33, no. 1, 1982 p 19-23
(BLL-M-28297-(5929.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A linear relation was obtained on plotting decrease in butynediol concentration due to nickel plating against time on a semilogarithmic graph. The rate of consumption of butynediol was determined from this relation, further analysis of which showed that butynediol was reduced to butanediol at the cathode surface. The current efficiency for electrodeposition of nickel decreases by an amount corresponding to the quantity of electricity required for reduction, so the nickel plating developes a bright, level finish. In addition, it was shown that the butanediol formed is accumulated in the plating solution.
Author

N83-16489*# National Aeronautics and Space Administration, Washington, D. C.
PHYSICOCHEMICAL INVESTIGATION OF NiAl WITH SMALL MOLYBDENUM ADDITIONS
V. A. Troshkina, L. A. Kucherenko, V. I. Fadeeva, and N. M. Aristova Nov. 1982 7 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR Metally (USSR), Nov. - Dec. 1973 p 142-144 Previously announced as A74-15192 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76987; NAS 1.15:76987) Avail: NTIS HC A02/MF A01 CSCL 11F

Specimens of four cast NiAl alloys, three of them containing 0.5, 1.0 and 1.5 at. % Mo., were homogenized for 10, 10, and 140 hr at 1373, 1523 and 1273 K, respectively, then kept at 1073, 1173 and 1323 K for 60, 120 and 3 hr, respectively, and quenched in icy water. The precipitation of a metastable Ni3Mo phase was observed at temperatures between 1073 and 1523 K. Molybdenum substituted for nickel was found to inhibit the lattice disordering in NiAl at 1073 and 1523 K.
Author

N83-16490*# SRI International Corp., Menlo Park, Calif.
A CORROSION CONTROL MANUAL FOR RAIL RAPID TRANSIT Final Report
Lloyd O. Gilbert, John H. Fitzgerald, III, Joseph T. Menke, and Ruth M. Lizak, ed. Mar. 1982 163 p refs Sponsored in part by NASA, Urban Mass Transit Administration, Army, The American Public Transit Association and Hinchman Company
(NASA-CR-169757; KSC-DD-621; NAS 1.26:169757; TR-26-2) Avail: NTIS HC A08/MF A01 CSCL 11F

This manual addresses corrosion problems in the design, contruction, and maintenance of rapid transit systems. Design and maintenance solutions are provided for each problem covered. The scope encompasses all facilities of urban rapid transit systems: structures and tracks, platforms and stations, power and signals, and cars. The types of corrosion and their causes as well as rapid transit properties are described. Corrosion control committees, and NASA, DOD, and ASTM specifications and design criteria to which reference is made in the manual are listed. A bibliography of papers and excerpts of reports is provided and a glossary of frequently used terms is included.
A.R.H.

N83-16491*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN ELECTROCHEMICAL METHOD FOR DETERMINING HYDROGEN CONCENTRATIONS IN METALS AND SOME APPLICATIONS
Merlin D. Danford Jan. 1983 18 p refs
(NASA-TP-2113; NAS 1.60:2113) Avail: NTIS HC A02/MF A01 CSCL 11F

An electrochemical method was developed for the determination of hydrogen in metals using the EG&G-PARC Model 350A Corrosion Measurement Console. The method was applied to hydrogen uptake, both during electrolysis and electroplating, and

to studies of hydrogen elimination and the effect of heat treatment on elimination times. Results from these studies are presented.
Author

N83-16492*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OPTICAL OBSERVATIONS OF UNIDIRECTIONAL SOLIDIFICATION IN MICROGRAVITY
Mary H. Johnston, Robert B. Owen, and Robert E. Shurney Jan. 1983 28 p refs
(NASA-TP-2110; NAS 1.60:2110) Avail: NTIS HC A03/MF A01 CSCL 11F

Optical interferometric, shadowgraph, and streak photographic methods are used to obtain temperature profiles, concentration gradients, and fluid velocities in NH4Cl-H2O metal-model solution during unidirectional solidification in microgravity. This study elucidates earlier low gravity suborbital rocket experiments and lays the groundwork for space shuttle experiments. The design and operation of the optical units are presented, and results are detailed to ground based experiments. The low gravity experiments were conducted using a KC-135 aircraft flying a parabolic trajectory. S.L.

N83-16493*# Kent State Univ., Ohio. Dept. of Physics.
APPLICATIONS OF ION BEAM TECHNOLOGY Final Report
Edward Gelerinter and Nathan Spielberg Aug. 1980 40 p refs
(Contract NAS3-21945)
(NASA-CR-169797; NAS 1.26:169797) Avail: NTIS HC A03/MF A01 CSCL 11F

Wire adhesion in steel belted radial tires; carbon fibers and composite; cold welding, brazing, and fabrication; hydrogen production, separation, and storage; membrane use; catalysis; sputtering and texture; and ion beam implantation are discussed.
Author

N83-16494# Dayton Univ., Ohio.
MATERIAL CHARACTERIZATION. PART A: MECHANICAL PROPERTIES OF 2 METALS AT SEVERAL STRAIN RATES
Susan A. Emery Wright-Patterson AFB, Ohio AFWAL May 1982 76 p refs
(Contract F33615-77-C-5221; AF Proj. 3066)
(AD-A119995; UDR-TR-79-98; AFWAL-TR-82-2042-Vol-1) Avail: NTIS HC A05/MF A01 CSCL 11/6

This report describes mechanical property data collected in support of a fan blade analysis model. The development of the blade model is part of a foreign object damage (FOD) study of jet engine fan blades. Use of the properties in the model allows one to evaluate potential fan blade materials. Part A of this report contains a discussion of the mechanical property tests conducted on two metallic materials: 410 stainless steel and 8Al-1Mo-1V titanium. Part B of the report contains a discussion of mechanical property tests conducted on the two composite components of a hybrid composite blade: boron/2024 aluminum and stainless steel wire mesh. Static, quasi-static and dynamic tensile tests were conducted on the metallic materials because (1) studies indicate that metallic mechanical properties exhibit strain rate dependence and (2) tests conducted on full scale blades show that various locations on the fan blades load at different rates. The mechanical properties measured include Young's Modulus (when obtainable), Poisson's ratio (when obtainable), the yield strength, the ultimate strength, and the ultimate strain. The density of the materials was also measured. GRA

N83-16495# Polytechnic Inst. of New York, Brooklyn.
THE PROPAGATION OF SLIP ACROSS ALPHA/BETA INTERFACES IN TITANIUM ALLOYS Interim Report
Christopher Hammond and Harold Margolin Dec. 1981 60 p refs
(Contract N00014-75-C-0793; Grant AF-AFOSR-0028-79)
(AD-A120316) Avail: NTIS HC A04/MF A01 CSCL 11/6

The occurrence of the interface phase in (alpha + beta) titanium alloys is reviewed, and it is shown that the observed f.c.c. structure and orientation relationship may be explained either by appropriate choices of lattice shears in the beta phase followed by atomic shuffles or by application of the Bowles-Mackenzie phenomenological theory of martensite transformations. In particular, the two orientation relationships which are reported to occur between the interface phase and the lattice ae rationalised in terms of variations in the principal lattice strain which in turn arises from variations in the beta lattice parameter with solute content. Transmission electron microscopy of Ti-1.8% Mn and Ti-3.9% Mn alloys heat-treated to provide a structure consisting of Widmanstatten alpha platelets in a beta matrix and strained up to 6% in compression showed (1) that the interface phase occurred in the polycrystalline form and (2) that it appeared to act as a barrier to slip from alpha to the beta phase. However, it is considered that the effectiveness of the interface phase, gamma, in these alloys in providing a barrier to slip arises primarily from its fine polycrystalline structure. GRA

N83-16496# Commissariat a l'Energie Atomique, Gif-sur-Yvette (France). Section de Recherches de Metallurgie Physique.
DIFFUSION IN METALS
Jul. 1981 41 p refs In FRENCH Presented at Summer School on Atomic Transport in Solids, Lannion, France, 29 Jun. - 11 Jul. 1981
(DE81-700661; CEA-CONF-5803; CONF-8106176-1) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

In crystalline solids and particularly in metals atom displacements are produced by point defects. At thermal equilibrium vacancies are mainly concerned, when temperature increases the proportion of divacancies increases and near the melting point their contribution to diffusion can be important. In metals, outside of equilibrium i.e. when point defects are produced, not only by temperature but by external conditions, for example plastic deformation or irradiation, vacancies and interstitials are created simultaneously and they both contribute to diffusion. Results concerning autodiffusion, heterodiffusion, chemical diffusion, electromigration and thermomigration are examined. DOE

N83-16497# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
SOLUTE-ELEMENT PARTITIONING AND AUSTENITE STABILIZATION IN STEELS
M. Sarikaya, G. Thomas, J. W. Steeds (Bristol Univ.), S. J. Barnard (Oxford Univ.), and G. D. W. Smith (Oxford Univ.) Aug. 1982 13 p refs
(Contract DE-AC03-76SF-00098)
(DE83-000544; LBL-13099) Avail: NTIS HC A02/MF A01

Considerable amounts of thin film retained austenite have been found in low to medium carbon lath martensitic structural steels. The existence of this metastable phase at room temperature has been attributed to several mechanisms which involve diffusion and redistribution of carbon during the austenite to martensite transformation. In this investigation electron microscopy (TEM), convergent beam electron diffraction (CBED) and field ion-atom probe (FIAP) analysis methods have been utilized to measure the C and other solute element distributions in retained austenite gamma, and martensite laths alpha'. Considerable carbon partioning to gamma and to alpha'/beta interfaces occurs during cooling, but there was no detectable change in substitutional alloying elements (Cr, Mn, Ni, Si) between alpha' and gamma. Thus while C plays a vital role in stabilization, it cannot account completely for this phenomenon. It is concluded that mechanical stabilization and the size effect are also major factors. DOE

N83-16498# Sandia Labs., Albuquerque, N. Mex.
TEMPERATURE DEPENDENCE OF ION BEAM MIXING IN Al
S. T. Picraux, D. M. Follstaedt, and J. Delafond 1981 10 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16 Nov. 1981
(Contract DE-AC04-76DP-00789)
(DE82-004294; SAND-81-1556C; CONF-811122-29) Avail: NTIS HC A02/MF A01

The atomic mixing of evaporated Al/Sb films and of Al/Ag films on Al <110> crystal substrates by 400 keV Xe ion beams

has been investigated. Concentration depth profiles were measured in situ by 1.5 MeV He scattering as a function of Xe fluence from 2 to 32 x 10 to the 15th power Xe/sq cm. The initial mixing rates are similar at 85 and 300 K; mixing proceeds by rapid motion of Al (approx 15 Al/Xe) into and uniformly through the thickness of the Sb film and by a slow motion of Sb (approx 0.5 Sb/Xe) into the Al <110> substrate. More rapid Sb mixing into Al occurs for polycrystalline Al. The rate for Al into Sb shows at concentrations approaching the stable AlSb phase. Appreciably higher rates of Sb mixing into Al (2.2 to 2.8 Sb/Xe) occur at 575 K. Mixing rates for the highly soluble system, Al/Ag, are compared to the nearly insoluble Al/Sb at 85 and 300 K. Appreciably higher rates are found for Ag than for Sb, suggesting the influence of chemical driving forces even at these low temperatures. DOE

N83-16499# Oak Ridge National Lab., Tenn. Solid State Div.
DEVELOPMENT OF MORPHOLOGICAL INSTABILITY AND CELLS DURING RAPID SOLIDIFICATION OF LASER ANNEALED SILICON ALLOYS
J. Narayan and C. W. White 1981 7 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16-19 Nov. 1981 Submitted for publication
(Contract W-7405-eng-26)
(DE82-003987; CONF-811122-32) Avail: NTIS HC A02/MF A01

The details of morphological instability occurring during rapid solidification have been studied in In(+), Ga(+), Sb(+), Bi(+), Ge(+), Fe(+) and Cr(+) implanted silicon specimens after pulsed laser annealing. The average cell sizes were determined at the onset of instability and in the region of well-developed instability using x-section and plan-view electron microscopy. The total and substitutional solute concentration profiles were determined using Rutherford backscattering and channeling techniques. The formation of cells and the critical solute concentrations associated with instability were studied as a function of velocity of solidification, which was varied by controlling the substrate temperature or the laser parameters. The results on the cell formation and the critical solute concentrations were compared with the predictions of the perturbation theory which took into account the dependence of distribution coefficients on the velocity of solidification. DOE

N83-16500# Ames Lab., Iowa.
SUPPRESSION OF MARANGONI CONVECTION WITH OXIDE FILMS
J. D. Verhoeven, M. A. Noack, and A. J. Bevolo Nov. 1981 10 p refs Presented at the Symp. on Mater. Process. in the Reduced Gravity Environ. of Space, Boston, Nov. 1981 Prepared in cooperation with Iowa State Univ. of Science and Technology
(Contract W-7405-eng-82)
(DE82-004776; IS-M-349; CONF-811162-1) Avail: NTIS HC A02/MF A01

Surface tension driven convection in molten tin is studied to determine if it can be eliminated by the formation of one to several monolayers of oxide on the molten tin surface. Auger and electron loss spectroscopies used to detect SnO and SnO2 on molten tin surfaces in a UHV system are described. Progress on efforts to produce and monitor controlled oxide layers of 8 to 20 A upon floating zones in a disk geometry is presented. DOE

N83-16501# Bendix Corp., Kansas City, Mo.
EFFECT OF PARTIAL PRESSURE AND TEMPERATURE ON PROPERTIES OF VACUUM DEPOSITED CHROMIUM-GOLD THIN FILMS
James C. Vaughan (Mississippi Univ., University), Larry R. Zawicki, and Neal C. Thomas Nov. 1981 18 p refs Presented at the Am. Vacuum Soc. Natl. Symp., Anaheim, Calif., 3-6 Nov. 1981
(Contract DE-AC04-76DP-00613)
(DE82-004576; BDX-613-2687R; CONF-811113-39-Rev) Avail: NTIS HC A02/MF A01

Chromium gold thin films were deposited on alumina substrates over a pressure range of 0.0267 to 13.3 mPa, with substrate temperatures ranging from 313 to 523 K. A quadrapole residual gas analyzer was used to record the bell jar gas spectrum before and during each run. Correlation of properties with oxygen and hydrogen partial pressure was observed. Adhesion of the chromium gold films as determined by a 90 degree pull test of thermocompression bonded lead frames was shown to have a bimodal distribution of very low or high strength dependent on oxygen partial pressure and substrate temperature. A system pressure of 6.67 mPa with a substrate temperature of 473 K resulted in the highest pull strengths and acceptable failure modes. DOE

N83-16502# Oak Ridge National Lab., Tenn. Solid State Div.
FISSION-NEUTRON DAMAGE RATES AND EFFICIENCIES IN SEVERAL METALS
C. E. Klabunde and R. R. Coltman, Jr. Nov. 1981 25 p refs Presented at the Intern. Conf. on Neutron Irradiation Effects, Argonne, Ill., 9-12 Nov. 1981 Submitted for publication
(Contract W-7405-eng-26)
(DE82-003996; CONF-811145-1) Avail: NTIS HC A02/MF A01

Initial rates of resistivity-measured low-temperature damage production by fission-spectrum fast neutrons have been determined for 14 metals in the same very well characterized irradiation facility. Six of these metals were fcc, 5 bcc, and 3 hcp. Most were of quite high purity. Observed damage rates, after correction for all known extraneous resistivity-producing effects, were compared with rates predicted by the damage calculation code RECOIL, using parameters chosen from the literature. These parameters, effective displacement threshold energy, E/sub d/, and Frenkel-pair resistivity, rho/sub F/, were in many cases only best estimates, the further refinement of which may be aided by the present results. Damage efficiencies (measured/predicted rates) follow the same trends by crystal classes as seen in other fast-neutron studies. DOE

N83-16503# Clemson Univ., S.C.
DEFECTS AND TRANSMUTATIONS IN REACTOR-IRRADIATED COPPER
R. L. Chaplin and R. R. Coltman, Jr. (Oak Ridge National Lab.) Nov. 1981 25 p refs Presented at the Intern. Conf. on Neutron Irradiation Effects, Argonne, Ill., 9-12 Nov. 1981 Submitted for publication
(Contract W-7405-eng-26)
(DE82-004110; CONF-811145-2) Avail: NTIS HC A02/MF A01

From measurements made at 4.2 K, the residual resistivity increases produced by reactor irradiation near room temperature were studied in pure Cu up to fluences of 4.2 x 10 to the 23rd power n/m(2) > MeV and 12 x 10 to the 23rd power thermal n/m(2) by methods which resolved the effects due to transmutations and to defects. While the increase in resistivity due to transmutations is linear, that due to defects falls off rapidly with increasing fluence. The defect damage rates at low doses depend upon initial sample conditions that are related to impurities, but they become equal above approximately 6 x 10 to the 21st power n/m(2) (e>1 MeV). Computations of defect concentrations using these resistivity data and earlier X-ray results, which measure dislocation loops, can be brought into reasonable agreement if the specific resistivity attributed to a single defect is decreased when that defect becomes part of a dislocation loop. DOE

N83-16504# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
RAPIDLY SOLIDIFIED LONG-RANGE-ORDERED ALLOYS
E. H. Lee, C. C. Koch, and C. T. Liu 1981 5 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16 Nov. 1981
(Contract W-7405-eng-26)
(DE82-004121; CONF-811122-20) Avail: NTIS HC A02/MF A01

The influence of rapid solidification processing on the microstructure of long range ordered alloys in the (Fe, Co, Ni)3 V system has been studied by transmission electron microscopy. The main microstructural feature of the as-quenched alloys was a fine cell structure (approx 300 nm diameter) decorated with carbide particles. This structure was maintained after annealing treatments which develop the ordered crystal structure. Other features of the microstructures both before and after annealing are presented and discussed. DOE

N83-16505# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
AN INVESTIGATION ON THE ENHANCEMENT OF THE CRITICAL CURRENT DENSITIES IN BRONZE-PROCESS Nb3Sn
M. Hong, I. W. Wu, J. W. Morris, Jr., W. Gilbert, W. V. Hassenzahl, and C. Taylor Oct. 1981 22 p refs Presented at the Cryog. Eng. Conf., San Diego, Calif., 10 Aug. 1981
(Contract W-7405-eng-48)
(DE82-003901; LBL-13015; CONF-810835-38) Avail: NTIS HC A02/MF A01

The work reported here addressed the problem of improving the critical current characteristic of a commercial multifilamentary Nb3Sn strand by varying its heat treatment. The work was done from the perspective that the critical current characteristic is controlled by the metallurgical state of the reacted layer, which is, in turn, fixed by the processing the wire has undergone. The research was carried out in parallel with metallographic studies which analyzed the microstructure and composition profile within the reacted Nb3Sn layer as a function of heat treatment. The combined results of metallographic and processing research suggest that it is possible to engineer the microstructure of the reacted layer to improve J/sub c/(H). The specific product of the work is a tailored double-aging treatment which introduces a favorable combination of microstructure and composition in the reacted layer and causes a substantial improvement in the critical current characteristic of the strand. DOE

N83-16506# Sandia Labs., Albuquerque, N. Mex.
METALLURGY AND MICROSTRUCTURES OF PULSE MELTED ALLOYS
D. M. Follstaedt 1981 11 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16 Nov. 1981
(Contract DE-AC04-76DP-00789)
(DE82-003578; SAND-81-1356C; CONF-811122-24) Avail: NTIS HC A02/MF A01

The microstructures found in pulse metals are reviewed. Epitaxial resolidification and the defects found in pure metals are discussed. Pulse melted alloys are then examined in order of increasing complexity. First, single phase alloys which solidify into metastable solid solutions are discussed. For higher concentrations and liquid-insoluble species, phase separation can occur, and the requirements for such separation are identified. If precipitation does not reduce the impurity concentration of the liquid, the liquid may be quenched to an amorphous solid. Comparisons of ion-implantation and pulse-melt produced amorphous alloys are given. DOE

N83-16507# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Materials Engineering.
HYDROGEN-EMBRITTLEMENT TESTING Status Report
M. R. Louthan, Jr. 10 Sep. 1982 11 p
(Contract DE-AS05-78ER-06039)
(DE83-001549; DOE/ER-06039/T1) Avail: NTIS HC A02/MF A01

Hydrogen embrittlement testing which provided insights into the difficulties of using electrochemical charging techniques to duplicate gas phase hydrogen was discussed. Several important hydrogen induced effects are studied. These effects included the observation of hydrogen induced weakening of metal-nonmetal interfaces and of metal-metal boundaries such as twin boundaries, grain boundaries and slip bands. Impact and slow bend testing of hydrogen charged samples illustrated that this weakening is inherent with hydrogen absorption and that dislocation transport of hydrogen is not necessary for interfacial embrittlement to occur. These observations are in agreement with the model that hydrogen absorption decreases the stress necessary for interfacial fracture to occur. DOE

N83-16508# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
MICROSTRUCTURE OF RAPIDLY SOLIDIFIED PATH A PRIME-CANDIDATE ALLOYS
J. Megusar, L. Arnberg, J. B. VanderSande, and N. J. Grant 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract DE-AS02-78ER-10107)
(DE82-006755; DOE/ER-10107/8; CONF-810831-71) Avail: NTIS HC A02/MF A01

Path A Prime-Candidate Alloy (PCA) has been rapidly solidified and its composition has been modified by increasing carbon and titanium content. Microstructural examination showed that rapid solidification allowed for a decrease in over-all segregation, elimination of coarse excess phases, an attainment of fine grain size and an increase in supersaturation of carbon and titanium in the PCA alloy. Structural modifications which include a reduction of grain size, an increase in TiC content and control of dislocation structure provide a high density of heterogeneous nucleation sites for helium trapping and are therefore expected to have an effect on swelling and high temperature strength of Path A alloys under irradiation. DOE

N83-16509# Brown Univ., Providence, R. I. Div. of Engineering.
AN INVESTIGATION OF THE TENSILE DEFORMATION AND FRACTURE OF A DUAL-PHASE STEEL
Andrew F. Szewczyk Nov. 1981 65 p refs
(Contract DE-AC02-80ER-10556)
(DE82-007522; DOE/ER-10556/86; TR-86) Avail: NTIS HC A04/MF A01

An analysis of the tensile deformation and fracture of a commercial dual phase steel was conducted with emphasis on the roles that the individual phases have in these processes. It was observed that the deformation of ferrite is somewhat inhomogeneous, as suggested by the nonuniform appearance of slip lines in ferrite grains. The plastic deformation of martensite, as determined by changes in the particles' average aspect ratio, was found to be appreciable only at strains much higher than the uniform strain to necking. The mechanism of failure was one of void formation, growth and coalescence. Void formation was observed to most frequently occur between the poles of two closely spaced martensite particles situated on ferrite grain boundaries. DOE

N83-16510# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
MECHANICAL PROPERTIES AND STRUCTURE OF RAPIDLY SOLIDIFIED HIGH-TITANIUM-STABILIZED 316 STAINLESS STEEL
E. Testart, J. Megusar, L. Arnberg, and N. J. Grant 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract DE-AC02-78ER-10107)
(DE82-006758; DOE/ER-10107/5; CONF-810831-70) Avail: NTIS HC A02/MF A01

Prime candidate alloy was rapidly solidified and its composition was modified by increasing carbon and titanium content. Rapidly solidified Path A alloy, with a fine grain size (approximately 5 microns) and controlled TiC dispersion, showed good room temperature tensile properties and favorable rupture strength and ductility at 923 K in the preirradiated condition. Structural modifications which include a reduction of grain size, an increase in TiC content and a control of dislocation structure are expected to have a beneficial effect on high temperature strength and swelling of Path A alloys under irradiation. DOE

N83-16511# Massachusetts Inst. of Tech., Cambridge. Nuclear Reactor Lab.
PRE-IRRADIATION SPATIAL DISTRIBUTION AND STABILITY OF BORIDE PARTICLES IN RAPIDLY SOLIDIFIED BORON-DOPED STAINLESS STEELS
N. Kanani, L. Arnberg, and O. K. Harling 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract DE-AS02-78ER-10107)
(DE82-003871; DOE/ER-10107-4; CONF-810831-77) Avail: NTIS HC A02/MF A01

The time temperature behavior of boride particles has been studied in rapidly solidified ultra low carbon and nitrogen modified

316 stainless steel with 0.088% boron and 0.45% zironium. The results show that the as splat cooled specimens exhibit precipitates at the grain boundaries and triple junctions. For temperatures up to about 750 C no significant microstructural changes occur for short heat treatment times. In the temperature range of 750 to 950 C, however, particles typically 100 to 500 A in diameter containing Zr and B are formed within the grains. Higher temperatures enhance the formation of such particles and give rise to particle networks. The results show that a fine and uniform distribution of the boride particles almost exclusively within the grains can be achieved if proper annealing requirement for the homogeneous production of helium during neutron irradiation in fast reactors. DOE

N83-16512# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
MICROSTRUCTURE OF RAPIDLY SOLIDIFIED Al2O3-DISPERSION-STRENGTHENED TYPE 316 STAINLESS STEEL
J. Megusar, L. Arnberg, J. B. VanderSande, and N. J. Grant 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract DE-AS02-78ER-10107)
(DE82-003870; DOE/ER-10107-3; CONF-810831-78) Avail: NTIS HC A02/MF A01

An aluminum oxide dispersion strengthened 316 stainless steel was developed by surface oxidation. Surface oxidation was chosen as a preferred method in order to minimize formation of less stable chromium oxides. Ultra low C+N 316 stainless steel was alloyed with 1 wt % Al, rapidly solidified to produce fine powders and attrited to approximately 0.5 micrometers thick flakes to provide for surface oxidation. Oxide particles in the extruded material were identified mostly as Al oxides. In the preirradiated condition, oxide dispersion retarded crystallization and grain growth and had an effect on room temperature tensile properties. These structural modifications are expected to have an effect on the swelling resistance, structure stability and high temperature strength of austenitic stainless steels (Path A alloys). DOE

N83-16513# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
MICROSTRUCTURE OF NEUTRON IRRADIATED RAPIDLY SOLIDIFIED PATH A PRIME-CANDIDATE ALLOYS
L. Arnberg, J. Megusar, D. Imeson, H. J. Frost, J. B. VanderSande, O. K. Harling, and N. J. Grant 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract DE-AS02-78ER-10107)
(DE82-006757; DOE/ER-10107/6; CONF-810831-69) Avail: NTIS HC A02/MF A01

A preliminary microstructural characterization was carried out for Path A Prime Candidate Alloy after neutron irradiation to a dose of about 5 dpa at temperatures from 573 to 873 K. A conventionally processed alloy was compared with a rapid solidification processed alloy without finding a large difference in the irradiation response at this dose. Both annealed and cold worked states were studied; in addition, a third alloy containing double the TiC content of the Prime Candidate Alloy was evaluated. A large number of small voids were observed, often associated with dislocations or particles, whose future development at higher doses is viewed as critical for a valid comparison between the conventional and rapid solidification processed alloys. DOE

N83-16514# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
LATH MARTENSITES IN CARBON STEELS. ARE THEY BAINITIC?
G. Thomas and M. Sarikaya Aug. 1982 15 p refs
(Contract DE-AC03-76SF-00098)
(DE83-000302; LBL-13098) Avail: NTIS HC A02/MF A01

A detailed metallographic, crystallographic, and spectroscopic analysis of lath martensites formed by quenching low and medium carbon steels confirms that these structures are not strictly martensitic since carbon redistribution occurs during transformation. A better description would be untransformed upper bainite with the interlath phase being carbon enriched austenite rather than carbide, as occurs in classic upper bainite. A summary of crystallographic results using convergent beam electron diffraction is presented. In a given packet, the laths cluster around < 111 >/sub (-) '/, and < 100 >/sub (-) '/, but as reported earlier, other orientations also occur between them. The common axis between a particular bundle of laths is < 110 >/sub (-) '/. Rotations between bundles of laths and deformation of retained austenite may be important in minimizing the shape deformation. DOE

N83-16515# Southwest Research Inst., San Antonio, Tex.
METALLURGICAL INVESTIGATION OF DISC CRACKING IN THE LP-2 TURBINE AT A NUCLEAR POWER STATION Final Report
H. C. Burghard Jul. 1982 128 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1398-7)
(DE82-906428; EPRI-NP-2269) Avail: NTIS HC A07/MF A01

An investigation of combined face cracking and rim cracking in discs of an LP steam turbine rotor was performed. The incident in question involved the development of major cracks in the hub/web transition on the outlet face of the disc as well as major cracking of the blade attachment steeples. Both types of cracking occurred in the No. 1 discs at both ends of a particular rotor. The program was based on a metallurgical evaluation of hub and rim samples of discs removed from the turbine rotor after approximately 31,000 hours of operation. In-depth metallographic and fractographic examinations of representative face cracks and rim cracks were conducted. In addition, the mechanical properties and chemical composition of each of the disc samples were determined. Analyses of crack surface deposits and bulk turbine deposits were also performed. DOE

N83-16516# Ohio State Univ., Columbus. Corrosion Center.
INTERGRANULAR STRESS-CORROSION CRACKING OF AUSTENITIC STAINLESS STEELS IN PWR BORIC-ACID STORAGE SYSTEMS Interim Report
D. D. Macdonald, G. A. Cragnolino, J. Olemacher, T. Y. Chen, and S. Dhawale Aug. 1982 162 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1166-1)
(DE82-906465; EPRI-NP-2531) Avail: NTIS HC A08/MF A01

A review is presented of the available literature on the intergranular stress corrosion cracking (IGSSC) of austenitic stainless steels at temperatures below 1000C, as well as the results of an experimental investigation of the IGSCC of Types 304, 304L, and 316L stainless steels conducted in boric acid environments of the type employed in pressurized nuclear reactors (PWRs) for nuclear shim control. The susceptibility of furnace sensitized Type 304SS to IGSCC was studied using slow strain rate tests as a function of pH, temperature, potential, and concentration of suspected contaminants: chloride, thiosulfate, and tetrathionate. Possible alternate alloys, such as Types 304L and 316L stainless steels, were also tested under those specific conditions that render Type 304SS susceptible to cracking. Corrosion potentials that can be attained in air-saturated boric acid solutions in the presence of the above mentioned species were measured in order to evaluate the propensity towards intergranular cracking under conditions simulating those that prevail in service. DOE

N83-16517# Badische Stahlwerke A.G., Kehl (West Germany).
DEVELOPMENT OF METALLURGICAL TECHNIQUES FOR THE PRODUCTION OF VERY SOFT STEELS BY CONTINUOUS CASTING METHODS Final Report, Jun. 1981
Harald Hinze and Hans-Peter Discher Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 64 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-145; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13

A method of producing wire from killed, small-sized contin-

uous cast steel was developed in order to replace the very soft grades cast in ingots from unkilled steel. This necessitated changes to the plant and applying certain techniques to the production process. The most important of these were: tapping slag from the steel in the electric furnace, deoxidizing the steel in the ladle by injecting calcium alloys, and preventing the steel from reoxidizing during teeming and in the tapping spout. Although the necessary technical conditions were fulfilled for the research operation and steels of the required qualities are produced, the degree of purity does not correspond to processing specifications. Author (ESA)

N83-16518# Rolls-Royce Ltd., Derby (England).
THE BEHAVIOUR OF DISLOCATIONS DURING PLASTIC DEFORMATION OF THE NICKEL-BASE SUPERALLOY RENE 80
Minoru Nemoto, Takayuki Honda, Jun-ichi Echigoya, and Hajime Suto Mar. 1982 29 p refs Transl. into ENGLISH from Nippon Kinzoku Gakkai-Shi (J. Japan Inst. Metals), v. 44, no. 8, 1980 p 933-942 In ENGLISH and JAPANESE Original language document announced as A81-10701
(PNR-90124; Trans-16085; TLT-00870) Avail: NTIS HC A03/MF A01
For abstract see A81-10701.

N83-16519# Central Electrochemical Research Inst., Karaikudi (India).
CORROSION BULLETIN, NUMBER 6, 1981 Bimonthly Report
K. S. Rajagopalan, ed. Sep. 1981 35 p refs
Avail: NTIS HC A03/MF A01
The behavior of stressed high tensile prestressing wires in aqueous alkaline environment containing chloride and in chloride bearing high strength concrete was examined. The following topics are discussed: corrosion control necessities better coordination; corrosion problems in ammonia plants; neutral and alkaline inhibitors; auger electron spectroscopy scanning auger microscopy and electron spectroscopy for chemical analysis; corrosion of high strength steel in prestressed concrete and its prevention; corrosion testing facilities in India; and kinetics of electrochemical corrosion. E.A.K.

N83-16520# Structural Engineering Research Centre, Madras (India).
EXPERIMENTAL TECHNIQUES FOR ASSESSMENT OF CORROSION OF EMBEDDED STEEL IN CONCRETE IN MARINE ENVIRONMENT
K. Mani and Zacharia George 1981 12 p refs
(PB82-261975) Avail: NTIS HC A02/MF A01 CSCL 13C
The general requirements for assessment for structures to be resistant to corrosion call for several experimental techniques for the detection of corrosion in steel embedded with or attached to the structures. The corrosion of embedded steel comes to be noticed only after the surrounding concrete has cracked; the corrosion process would have started much earlier. Visual surveillance was the widely adopted method for checking the structures for corrosion and no standard procedures and techniques are adopted for regular inspection of structures. As the theory of corrosion process and the influencing factors are fairly understood, it is now possible to develop and employ standard procedures and suitable techniques for monitoring structures for detection of corrosion. Techniques which can be effectively used for monitoring the structures and the developments needed to obtain reliable results are described. GRA

N83-16521# Economic and Engineering Services, Inc., Olympia, Wash.
PRINCIPLES OF CORROSION AND CORROSION MONITORING
Gregory J. Kirmeyer and Gary S. Logsdon (EPA, Cincinnati, Ohio) Aug. 1982 21 p refs Presented at conference Submitted for publication
(PB82-258625; EPA-600/D-82-329) Avail: NTIS HC A02/MF A01 CSCL 11F
Problems caused by corrosion of utility water distribution and home plumbing systems can be grouped into 3 categories: health, aesthetics and economics. For electro-chemical corrosion reaction to proceed, all components of an electrochemical cell are required - an anode, a cathode, a connection between the anode and cathode and a conducting solution. Corrosivity is affected by many factors, including pH, alkalinity, dissolved oxygen, flowrate, temperature and others. Methods for documenting corrosion range from simple visual inspections to complex scale analysis including weight loss and pitting depth measurements and corrosion probes. Laboratory and pilot tests can be used to define the extent and magnitude of corrosion. GRA

N83-16522# Cambridge Univ. (England). Dept. of Engineering.
THE USE OF COMPLIANCE AND ELECTRICAL RESISTANCE TECHNIQUES TO CHARACTERISE FATIGUE CRACK CLOSURE Final Report
N. A. Fleck Jan. 1982 116 p refs Sponsored in part by the Dept. of Education of Northern England
(PB82-253857; CUED/C-MATS/TR-89; ISSN-0309-6505) Avail: NTIS HC A06/MF A01 CSCL 11F
The use of compliance and d.c. potential techniques for monitoring the closure response of BS4360 Grade 50B structural steel were investigated. The cyclic loads on 3mm thick compact tension specimens were shed manually to maintain a constant stress intensity range and load ratio. Compliance methods indicated the crack to be closed for 28 plus or minus 4% of the load range, with the crack closing right back to the notch at minimum load. The stress intensity at which the crack closed was independent of crack length and location of compliance gauge behind the crack tip, except for the near crack tip strain gauge. The manner in which the fatigue crack opened at loads between minimum load and the crack opening load was deduced from compliance measurements. GRA

N83-16523# Cambridge Univ. (England). Dept. of Engineering.
DEFORMATION-MECHANISM MAPS FOR METALS AND ALLOYS
H. J. Frost and M. F. Ashby Nov. 1981 220 p refs Prepared in cooperation with Harvard Univ., Cambridge, Mass.
(PB82-253774; CUED/C-MATS/TR-87; ISS-0309-6505) Avail: NTIS HC A10/MF A01 CSCL 11F
The various mechanisms by which crystalline solids deform plastically were investigated and deformation mechanism diagrams or maps showing the field of stress, temperature and strain rate over which each mechanism is dominant were constructed for some 40 pure metals, alloys and ceramics. The maps were constructed from experimental data and fitted to model based rate equations which described the mechanisms. Further developments (including transient behavior, influence of pressure, behavior at very low and very high strain rates) and the problem of scaling laws were studied and the use of the maps demonstrated by a number of simple case studies. GRA

N83-17366*# Vanderbilt Univ., Nashville, Tenn. Dept. of Mechanical and Materials Engineering.
CONTAINERLESS PROCESSING OF Nb-Ge ALLOYS IN A LONG DROP TUBE
Robert J. Bayuzick *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 8 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11F

N83-17367*# Vanderbilt Univ., Nashville, Tenn. Dept. of Civil and Environmental Engineering.
THEORETICAL MODEL OF THE EFFECT OF CRACK TIP BLUNTING ON THE ULTIMATE TENSILE STRENGTH OF WELDS IN 2219-T87 ALUMINUM
Robert J. Beil *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 39 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11F

N83-17371*# Alabama A & M Univ., Normal. Dept. of Chemistry.

SOLIDIFICATION STUDIES OF MONOTECTIC SYSTEMS
Kichoon Chang *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 16 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11F

N83-17383*# Missouri Univ., Rolla. Dept. of Metallurgical Engineering.
THE MEASUREMENT OF THE STACKING FAULT ENERGY IN COPPER, NICKEL AND COPPER-NICKEL ALLOYS
H. P. Leighly, Jr. *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 8 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11F

N83-17400*# Alabama A & M Univ., Normal. Dept. of Physics.
INVESTIGATION OF COMPOSITIONAL SEGREGATION DURING UNIDIRECTIONAL SOLIDIFICATION OF SOLID SOLUTION SEMICONDUCTING ALLOYS
Jai-Ching Wang *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11F

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N83-16524*# National Aeronautics and Space Administration, Washington, D. C.
APPLICATION OF ORGANIC SOLID ELECTROLYTES
Satoshi Sekido Sep. 1982 14 p refs Transl. into ENGLISH from Kobunshi (Japan), v. 30, no. 11, Nov. 1981 p 834-837 Transl. by Kanner (Leo) Associates, Santa Barbara, Calif.
(Contract NASw-3541)
(NASA-TM-76952; NAS 1.15:76952) Avail: NTIS HC A02/MF A01 CSCL 11G

If ions are considered to be solid material which transport electric charges, polymer materials can then be considered as organic solid electrolytes. The role of these electrolytes is discussed for (1) ion concentration sensors; (2) batteries using lithium as the cathode and a charge complex of organic material and iodine in the anode; and (3) elements applying electrical double layer capability. A.R.H.

N83-16525*# National Aeronautics and Space Administration, Washington, D. C.
ASSOCIATION-SOLVATION CHARACTERISTIC OF FUELS AND LUBRICATING AND HYDRAULIC OILS
W. Szachnowski and B. Wislicki Sep. 1982 26 p refs Transl. into ENGLISH from Inst. Lotnictwa (Prace), no. 69-70, 1977 p 125-141 Previously announced in IAA as A78-26758 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76957; NAS 1.15:76957) Avail: NTIS HC A03/MF A01 CSCL 07D
For abstract see A78-26768.

N83-16526# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
THE BASIS OF EMULSIFYING AGENTS
T. Kariyone 1983 33 p refs Transl. into ENGLISH from Toso to Toryo (Japan), v. 4, no. 337, 1981 p 41-50
(NRC/CNR-TT-2040; ISSN-0077-5606) Avail: NTIS HC A03/MF A01

The function, effective applications, and basic properties of emulsifying agents are discussed. Selection of an emulsifying agent by the HLB method is reviewed. Solubilization is discussed. Emulsifying agents used for emulsion polymerization are also discussed. Author

N83-16527*# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mechanical Engineering.
DETERMINATION OF PHYSICAL AND CHEMICAL STATES OF LUBRICANTS IN CONCENTRATED CONTACTS, PART 3 Final Report
James L. Lauer and Leonhard Keller Washington NASA Feb. 1983 111 p refs
(Grant NsG-3170)
(NASA-CR-3658; NAS 1.26:3658) Avail: NTIS HC A06/MF A01 CSCL 11H

Solid and liquid thin films were analyzed by infrared emission Fourier microspectrophotometry. The apparatus used is a commercial absorption instrument modified to an emission instrument, comprising a rotating polarizing device, a miniature blackbody temperature reference adjustable in temperature and radiant flux and a microscope lens with a high numerical aperture in the entrance system for increased sensitivity and resolution. Studies of lubricant behavior in a simulated ball bearing showed the alignment of the fluid molecules in the Hertzian area. Polyphenyl ether plus 1% 1,1,2-trichloroethane (TCE) required lower shear rates for the same degree of alignment than without TCE. The experiment was run with 440 C stainless steel balls coated with TiN, a chemically inert material. In both cases, the alignment was strongly influenced by the presence of TCE. The results showed (1) the dependence of alignment of fluid molecules on flow and not on adsorption at metallic surfaces, (2) phase separation between lubricant and additive under high pressure which results in two phase flow and (3) reduction in traction of torque transmitting (traction) fluids. Author

N83-16528*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS OF A MIL-L-27502 LUBRICANT FROM A GAS-TURBINE ENGINE TEST BY SIZE-EXCLUSION CHROMATOGRAPHY
William R. Jones, Jr. and Wilfredo Morales Jan. 1983 15 p refs (NASA-TP-2063; E-1075; NAS 1.60:2063) Avail: NTIS HC A02/MF A01 CSCL 11H

Size exclusion chromatography was used to determine the chemical degradation of MIL-L-27502 oil samples from a gas turbine engine test run at a bulk oil temperature of 216 C. Results revealed a progressive loss of primary ester and additive depletion and the formation of higher molecular weight products with time. The high molecular weight products absorbed strongly in the ultraviolet indicating the presence of chromophoric groups. S.L.

N83-16529# SRI International Corp., Menlo Park, Calif.
SYNTHESIS OF ENERGETIC POLYMERS Final Report, 15 Jul. 1979 - 14 Sep. 1982
Gerald E. Manser and Donald L. Ross 15 Sep. 1982 102 p refs
(Contract N00014-79-C-0525; NR Proj. 093-063)
(AD-A120199) Avail: NTIS HC A06/MF A01 CSCL 07/3

The objective of this work was to investigate energetic polyether glycol prepolymers for cast-cured propellants and explosives. We investigated the synthesis of several energetic cyclic ether monomers and methods for their polymerization. To optimize the physical properties of the polymers, we examined the relationship of monomer structures to polymerization ability. This information was then used to select monomer pairs that would produce random copolymers, materials that have a very low degree of crystallinity. This low crystallinity is reflected in the superior elastomeric properties and plasticizer retention of the polymers examined. Preliminary evaluation of the polyether glycols and cured gum stocks indicate that binders can be produced that will add considerable energy content to propellant formulations. Ten polymers were investigated; one of these, the BAMO/THF copolymer, has been produced in multipound quantities and actual propellant formulation and testing is being conducted in various laboratories. Author (GRA)

N83-16530# Pittsburgh Univ., Dept. of Metallurgical and Materials Engineering.

MECHANISM OF THERMAL DEGRADATION OF SOME POLY-PHOSPHAZENES

S. V. Peddada and J. H. Magill 27 Sep. 1982 43 p refs
(Contract N00014-77-C-0310)
(AD-A120404; SETEC-MME-82-082; TR-7) Avail: NTIS HC A03/MF A01 CSCL 11/9

The mechanism of degradation of poly(bis(trifluoroethoxy)(phosphazene) (PBFP) and poly(bis(phenoxy)(phosphazene) (PBPP) have been examined using dynamic and isothermal thermogravimetry. The dynamic experiments were made between 50 deg and 750 deg C at several heating rates from 2.5 deg to 80 deg C/min. and the isothermal measurements were made at 325 deg, 340 deg, 355 deg and 370 deg C. The polymers and their degraded residues were characterized by gel permeation chromatography, infrared spectroscopy and intrinsic viscosity. In PBFP, the overall activation energy for degradation (Ed) was between 23.2 (isothermal) to 26.6 (dynamic) kcal/mole. The order of reaction was 0.3 + or - 0.1. Maxima in the rates of isothermal degradation occurred between 30 and 35% weight loss. Based upon experimental results, the mode of initiation in PBFB was deduced as occurring at the chain ends. Sample molecular weight dropped rapidly with degradation in harmony with a few random breaks occurring at weak points along the main chain after the degradation has been initiated at the chain ends. Literature results on the thermal degradation of PBFP in vacuum was shown to be consistent with a terminal initiation-chain transfer mechanism.GRA

N83-16531# Pacific Northwest Lab., Richland, Wash.
SPUTTERED CERAMIC COATINGS AND SEALING LAYERS

J. T. Prater, J. W. Patten, D. D. Hays, and R. W. Moss Oct. 1981 15 p refs Presented at the 2nd Conf. on Advan. Mater. for Alternative fuel Capable Heat Eng., Monterey, Calif., 24 Aug. 1981
(Contract DE-AC06-76RL-01830)
(DE82-005225; PNL-SA-9961; CONF-810885-3) Avail: NTIS HC A02/MF A01

Progress on the development of hybrid ceramic/metal sputter deposited coatings which are designed to be adherent to metal substrates in gas turbine hot sections is reported. The ceramic materials investigated are ZrO2 + 20% Y2O3 and pure Al2O3. The metal is CoCrAlY. In general, a CoCrAlY layer is sputter deposited first. The composition is then graded so that the ceramic content increases towards the coating surface. This transition zone has a segmented (columnar) structure, and varies in thickness. In some cases, the coating surface still contained some CoCrAlY. Heat treatments were conducted on these deposits in an effort to provide a continuous metal (minority phase) matrix along the ceramic grain boundaries. For other deposits, the grading is continued until no metal is present, and a thick layer of pure ceramic is deposited over the graded material. Preliminary thermal cycle results, microstructural characterization, and composition profile data are presented. DOE

N83-16532# Oak Ridge National Lab., Tenn. Solid State Div.
RUTHERFORD BACKSCATTERING INVESTIGATION OF THE CORROSION OF BOROSILICATE GLASS

B. C. Sales, L. A. Boatner, H. Naramoto, and C. W. White Oct. 1981 10 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, Mass., 16 Nov. 1981
(Contract W-7405-eng-26)
(DE82-004053; CONF-811122-46) Avail: NTIS HC A02/MF A01

The RBS spectra from Frit 21 borosilicate glasses doped with 5 wt % UO2, SrO, or Cs2O show that: during the initial stages of leaching (0 to 3 h) there is a substantial (300 to 500%) enhancement in the concentration of U, Sr, Ca, and Ti in the outer surface layer and that this enhancement is accompanied by a large depletion of Na, Si, and Cs; and upon further leaching under static conditions (24 h) the leached surface layer composition is indistinguishable from the unleached surface. Other borosilicate glasses such as PNL 76-68 may eventually show the same behavior if the final equilibrium pH value is greater than 9. The technique of Rutherford backscattering depth profile analysis can be a powerful tool for investigating the initial stages of glass corrosion. DOE

N83-16533# Westinghouse Electric Corp., East Pittsburgh, Pa. Steam Turbine Generator Technical Operations Div.
REMOTE DETECTION OF DEGRADATION OF FIRE-RESISTANT FLUID LUBRICANTS Interim Report

E. J. Shestak Aug. 1982 78 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 893-1)
(DE82-906461; EPRI-NP-2543) Avail: NTIS HC A05/MF A01

The original work under EPRI contract RP893-1 identified a phosphate ester lubricant as having the necessary lubricating and fire properties for use as a fire resistant lubricant in reactor coolant pump motors. However, these lubricants are subject to self-catalyzing degradation. The purpose of this added effort was to identify, review, and rank existing and innovative methods for remotely monitoring the lubricant degradation. Several possible techniques were identified and preliminary experimental evaluation was performed on three of them. Of the techniques considered, measurement of fluid resistivity or conductivity shows the most promise. The major advantages of conductivity measurement are that it is based on simple, mature hardware, thus providing high reliability of the instrumentation itself, and that there is substantial evidence that it will not give a false satisfactory indication as the fluid starts to degrade. The major disadvantages are that it is not a direct measure of fluid acid number, the pertinent degradation parameter, and that it is also affected by fluid contaminants, such as water, which may accelerate fluid degradation but are not directly related to the immediate condition of the fluid. DOE

N83-16534# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
MECHANISMS OF HIGH-TEMPERATURE FAILURE INITIATION IN LIQUID-PHASE-SINTERED CERAMICS M.S. Thesis

John E. Marion, II Dec. 1981 61 p refs Prepared in cooperation with California Univ., Berkeley
(Contract W-7405-eng-48)
(DE82-007752; LBL-13684) Avail: NTIS HC A04/MF A01

The mechanisms for inception of high temperature failure in liquid phase sintered ceramics are investigated. Results of a transmission electron microscopy study are used as a basis for developing evolution time expressions for each stage of failure initiation. Based on the TEM observations, a sequence for the initiation of failure is proposed, covering the void nucleation event through cavity growth to full grain facet size. Cavitation is found to initiate in second phase pockets at three grain channels by the nucleation of thermodynamically stable voids. These holes are enlarged by viscous flow of amorphous material into the surrounding two grain junctions, depleting the triple point pockets. At high local stress, subsequent cavitation is dominated by the growth of holes along neighboring two grain interfaces; whereas at low local stress, cavitation proceeds by solution/reprecipitation. DOE

N83-16535# Cambridge Univ. (England). Dept. of Engineering.
DEFORMATION MECHANISM MAPS FOR CERAMICS Final Report

H. J. Frost (Dartmouth College) and M. F. Ashby May 1981 135 p refs
(PB82-253782; CUED/C-MATS/TR-79; ISSN-0309-6505) Avail: NTIS HC A07/MF A01 CSCL 11A

Deformation mechanism maps for polycrystalline Si, Ge, ice and a number of carbides, oxides and alkali halides were presented. Maps were constructed from a compilation of data on the relations between (1) stress and temperature and (2) strain rate and stress. The general features of deformation of each system were discussed in terms of creep rate behavior. The work was restricted to only one grain size for each system, except for ice, magnesia and alpha-alumina where the proliferation of different diffusional flow fields enabled construction of maps for various grain sizes (1 micrometers to 10 mm). GRA

N83-16536# Technische Univ., Berlin (West Germany). Inst. fuer Nichtmetallische Werkstoffe.
PREPARATION OF SINTER-ACTIVE SILICON CARBIDE POWDERS
W. Boecker, H. Landfermann, and H. Hausner Feb. 1981 97 p refs Transl. into ENGLISH of the mono. "Herstellung von Sinteraktiven Sic-Pulvern" Original language document was announced as N82-14302
(PB82-258542; BMFT-FB-T-81-038) Avail: NTIS HC A05/MF A01 CSCL 11B

Pressureless sintering of silicon carbide powders permits the production of more complicated components than is possible with existing pressure-sinter methods. The production of sinter-active SiC powders and the influence of process parameters in the pressureless sintering of SiC into high-density materials are described. It is shown possible to produce sinter denities of CH-110 or 95 percent with powders produced from pyrolysis of methyl silane. GRA

N83-16537# California Univ., Los Angeles.
DEVELOPMENT OF SUBSTITUTES FOR ASBESTOS Open File Report, 28 Sep. 1979 - 1 Apr. 1981
John D. MacKenzie Nov. 1981 29 p refs
(PB82-252016; BUMINES-OFR-124-82) Avail: NTIS HC A03/MF A01 CSCL 11B

Experiments were conducted to determine the feasibility of using waste slate and limestone as a substitute for asbestos when producing glass powders and fibers. Glasses were made from mixtures of Vermont slate and limestone. The alkali resistance of the glass powders and the glass fibers was superior to that of glass powders and glass fibers based on compositions containing large amounts of zirconia. Some of the present glass compositions have alkali-resistance almost as good as that of chrysotile asbestos. Because of the low cost, ready availability in the United States, low melting temperatures, and ease of rendering into glass fibers, waste slate and limestone can be considered as substitutes for asbestos for many cement-type applications. Author (GRA)

N83-16538# Centre Technique des Industries Mecaniques, St. Etienne (France).
EVALUATION OF LUBRICANTS FOR AIR COMPRESSORS Final Report
N. Allier and J. G. Schamelhout Sep. 1979 315 p refs Transl. into ENGLISH of mono. "Des Lubricants Pour Compresseurs d'Air" Original language document was announced as N82-10408/4
(PB82-259003; CETIM-12-E-12-0) Avail: NTIS HC A14/MF A01 CSCL 11H

The document provides the results of a detailed study of methods for evaluating both mineral and synthetic lubricants for use with reciprocating and rotary air compressors. The main concern with respect to reciprocating air compressors is that the lubricants should be adequately evaluated from the points of view of safety toward man and the environment, and safety toward the equipment. In addition to describing the studies and their results, the document discusses the basics of lubrication and its application to air compressors; the formation of carbon deposits and the rise of fire in reciprocating compressors; standards relating to lubricants for air compressors; and assessment of air compressors available in the world market. GRA

N83-16539# Carnegie-Mellon Univ., Pittsburgh, Pa. Steel Structures Painting Council.
EVALUATION OF LOW SOLVENT MAINTENANCE COATINGS FOR HIGHWAY STRUCTURAL STEEL Final Report, Oct. 1978 - Sep. 1981
Joseph A. Bruno, Jr. and John D. Keane Dec. 1981 95 p refs (Contract DOT-FH-11-9468)
(PB82-249640; FHWA/RD-81/019) Avail: NTIS HC A05/MF A01 CSCL 11C

Organic solvents released from maintenance coatings for structural steel contribute to air pollution and are increasingly subject to environmental restrictions. Current and anticipated coatings technologies and regulations were therefore evaluated to determine their probable impact upon highway bridge painting practices. The industry has diverted major research efforts toward developing of coatings having low solvent content and freedom from lead, chromate, carcinogens and other suspect materials. Most promising technologies include water-borne solutions and latices as well as reformulations with chlorinated solvents for mild and moderate environments; water thinned zinc rich paints, water-borne and high solid epoxies for more severe environments. Water-borne systems are being evaluated on more than 25 bridges, principally in California and Florida. GRA

N83-16540# National Bureau of Standards, Washington, D.C. Building Materials Div.
DEVELOPMENT OF A TEST APPARATUS AND METHODS FOR MEASURING ADHESION OF PROTECTIVE COATINGS
James F. Seller, Mary E. McKnight, and Larry W. Masters Jul. 1982 40 p refs Sponsored in part by Tri-Service Building Materials Investigation Program Committee
(PB82-250010; NBSIR-82-2535) Avail: NTIS HC A03/MF A01 CSCL 11C

A pneumatic test apparatus and associated test method for measuring the adhesion of coatings were developed with particular emphasis on: overcoming some of the shortcomings of existing tests; and providing a method which can provide quantitative information for both laboratory and field applications. The test apparatus utilizes compressed air to lift a stainless steel loading fixture (button) which is bonded with an adhesive to the surface of the protective coating. The rate at which the loading fixture is loaded is controlled by a precision air pressure gauge and the tensile force required to lift the button from one coating is measured. Assuming the level of adhesion of the adhesive to the coating is greater than that of the coating to the substrate, the tensile force provides a measure of the coating adhesion.
Author (GRA)

N83-16541# Transport and Road Research Lab., Crowthorne (England). Earthworks Section.
STRENGTH TESTING OF GEOTECHNICAL FABRICS Interim Report
A. McGown, K. Z. Andrawes, R. F. Wilson-Fahmy, and K. C. Brady 1981 24 p refs Prepared in cooperation with Strathclyde Univ.
(PB82-254319; TRRL/SR-703; ISSN-0305-1315) Copyright. Avail: NTIS HC A02/MF A01 CSCL 11E

A review was carried out of manufacturing methods for geotechnical fabrics and tests to define their load extension properties. Some fabrics have complex three dimensional structures and most are unlikely to be uniform or isotropic. Current test methods do not enable the load extension behavior to be studied while the fabric is subjected to the normal compressive stresses acting through soil when the fabric is in service. It was judged that data from such tests might not be suitable for design purposes and of current test methods the simple uniaxial stress test appeared to be the most appropriate for quality control work. The results of a series of uniaxial stress tests using needle punched fabric indicated that the minimum dimensions of test specimens should be 100 mm (long) and 200 mm (wide). GRA

N83-16542# Transport and Road Research Lab., Crowthorne (England). Earthworks Section.
A NEW METHOD OF DETERMINING THE LOAD-EXTENSION PROPERTIES OF GEOTECHNICAL FABRICS Final Report
A. McGown, K. Z. Andrawes, R. F. Wilson-Fahmy, and K. C. Brady 1981 20 p refs Prepared in cooperation with Strathclyde Univ.
(PB82-254327; TRRL/SR-704; ISSN-0305-1315) Copyright. Avail: NTIS HC A02/MF A01 CSCL 11E

A new testing technique was developed to study the strength of geotechnical fabrics while the fabric is subjected to a normal compressive stress acting through a soil medium. The new in-soil, uniaxial test apparatus was used to investigate the load extension behavior of two woven and two non-woven fabrics. Although the load extension behavior of the woven fabrics was found to be significantly effected by the orientation of the test specimens, it was not influenced by the level of the compressive stress. By

contrast, the non-woven fabrics proved to be essentially isotropic, but the effect of confining pressure on the load extension properties was quite marked. Author (GRA)

N83-17377*# Mississippi State Univ., Mississippi State. Dept. of Chemical Engineering.
STRUCTURAL APPLICATION OF HIGH STRENGTH, HIGH TEMPERATURE CERAMICS
William B. Hall *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 11 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11B

N83-17384*# Tuskegee Inst., Ala. Dept. of Chemistry.
ULTRAHIGH MOLECULAR WEIGHT AROMATIC SILOXANE POLYMERS
Larry M. Ludwick *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 13 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11G

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N83-16543*# California Univ., Berkeley. Dept. of Chemical Engineering.
VISCOMETRIC AND MISTING PROPERTIES OF POLYMER-MODIFIED FUEL Final Technical Report, 1 Nov. 1981 - 30 Sep. 1982
E. A. Grens, II and M. C. Williams 1982 9 p refs
(Contract NCC2-163)
(NASA-CR-169750; NAS 1.26:169750) Avail: NTIS HC A02/MF A01 CSCL 21D

Solutions of polyisobutylenes L160, L200, B200, and B230 in Jet-A were prepared at concentrations up to 3000 ppm. These polymers have molecular weights in the range 5 to 9 x 1,00,000 and have previously been shown to induce anti-misting properties in Jet-A. In connection with the pumpability of such solutions, especially at low temperatures, the shear viscosity, eta, of these solutions was measured at temperatures 25 C, 0 C, and -25 C. Concentration-dependence of eta was very similar for all four polymer solutes, the increase of eta(c) at 3000 ppm being roughly four-fold (relative to Jet-A) for the L-series and five-fold for the B-series. This behavior prevailed at all temperatures, and there was no evidence of phase separation or other chemical instability at -25 C at any concentration. In the more practical c-range for anti-misting applications, say within 1000 ppm, the increase of eta(c) was only twofold. Author

N83-16544*# National Aeronautics and Space Administration, Washington, D. C.
AN ULTRASONIC METHOD FOR CLASSIFYING STANDARD PETROLEUM FUELS
Wieslaw Szachnowski and Bogdan Wislicki Sep. 1982 32 p refs Transl. into ENGLISH of "Ultradzwiekowa Metoda Kwalifikowania Standardowych Paliw Naftowych" Rept. 69-70 Inst. Lotnictwa, Prace (Poland), 1977 p 157-179 Original language document was announced as A78-26760
(Contract NASw-3542)
(NASA-TM-76958; NAS 1.15:76958) Avail: NTIS HC A03/MF A01 CSCL 21D
For abstract see A78-26760.

N83-16545*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MODELING OF SPACE VEHICLE PROPELLANT MIXING
John C. Aydelott Jan. 1983 27 p refs
(NASA-TP-2107; E-1275; NAS 1.60:2107) Avail: NTIS HC A03/MF A01 CSCL 21I

An experimental program was conducted to examine the liquid flow patterns that result from the axial-jet mixing of ethanol in 10-cm-diameter spherical and cylindrical containers under zero-, reduced-, and normal-gravity conditions. Dimensionless parameters were developed that characterized the observed liquid flow patterns and the bulk-liquid mixing phenomena. The correlations developed, were used to analyze a typical liquid hydrogen tank and internal thermodynamic vent system for a shuttle-compatible space tug similar to current orbit transfer vehicle concepts. A.R.H.

N83-16546# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md. Chemical Propulsion Information Agency.
SELECTED BIBLIOGRAPHIES, HANDBOOKS, MANUALS AND REVIEWS: CHEMICAL PROPULSION
Aug. 1982 26 p Revised
(Contract N00024-81-C-5301)
(AD-A121521) Avail: NTIS HC A03/MF A01 CSCL 21/4

Listing of references to selected bibliographies, handbooks, manuals, and reviews concerning chemical propulsion was prepared to provide a ready means of rapid retrieval for those popular reports which are generally broad in scope. The documents cited resulted from collecting, condensing, summarizing, or analyzing the available knowledge or literature in the subject area, and provide tools for familiarization with the progress or status of the chemical propulsion technologies represented. E.A.K.

N83-16547# Naval Explosive Ordnance Disposal Facility, Indian Head, Md. Technical Information Dept.
THE EFFECT OF CONTACT RESISTANCE ON THE INITIATION OF THERMAL EXPLOSION BY IMBEDDED WIRES Final Report
M. S. Mahmoud Jul. 1982 18 p refs
(AD-A120609; NAVEODTECHCE-TR-254) Avail: NTIS HC A02/MF A01 CSCL 19/4

The contact resistance between the hot wire and the exothermic material is incorporated in the thermal ignition model. A new solution to the interface temperature was developed and used in the explosion criterion to predict more accurately the explosion delay time. The new solution is derived for variable current heating as well as for constant current heating. Use of the solution is illustrated and compared with other solutions of the problem of D.C. heating a wire in perfect contact with exothermic material. It was found that for values of H (the outer conductivity of the surface of the wire) between infinity and 0.1, the change in the explosion delay is minimal. By decreasing H further, the explosion delay time increases considerably. Use of the solution for variable current heating is also illustrated in another example.
Author (GRA)

N83-16548# California Univ., Livermore. Lawrence Livermore Lab.
ENTHALPIC STUDY OF THE THERMAL DECOMPOSITION OF UNCONFINED TATB
Edward Catalano and Patricia C. Crawford Oct. 1981 36 p refs Presented at 9th DOE Compatability Meeting, Saint Petersburg, Fla., 27-29 Oct. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE82-002058; UCRL-86784; CONF-811076-1) Avail: NTIS HC A03/MF A01

The thermal decomposition of triaminotrinitrobenzene (TATB) under unconfined conditions was studied by isothermal calorimetric techniques using a differential scanning calorimeter. Between 615 $<$ or = to T $<$ or = to 630 K, the isothermal decompositions consist of perhaps as many as five distinct steps. By fitting the data with established solid state kinetic rate laws, activation energies for each of the five steps are calculated. Author

N83-16549# United Technologies Corp., East Hartford, Conn.
CHEMICAL EFFECTS IN VAPORIZING SYNTHETIC FUELS Quarterly Report, 23 Jun. - 31 Oct. 1981
Alexander Vranos and David S. Liscinsky Oct. 1981 25 p refs

(Contract DE-AC22-81PC-40278)
(DE82-003352; DOE/PC-40278/T1; R81-535720-1Q; QR-1) Avail: NTIS HC A02/MF A01

The objectives of this first quarter effort were to investigate the decomposition of SRC-II middle distillate under surface vaporizing conditions and to develop suitable analytical methods for the characterization of SRC-II fuel and vaporized fuel samples. Glass capillary gas chromatography provided a rapid and accurate method of fuel analysis and is the preferred method for analyzing fuel samples. High performance liquid chromatography is expected to be most useful in the analysis of labile or high molecular weight reaction products. Surface vaporization studies were conducted as a function of temperature, residence time and carrier gas oxygen concentration. The dominant variable was temperature, and the most extensive decomposition occurred at the lowest temperature and heating rate studied. The extent of change of individual fuel components was primarily a function of volatility with some dependence on chemical functionality. It is concluded that, for the conditions studied, most of the chemical change occurs within the liquid phase, and this is primarily a liquid phase residence time effect. DOE

N83-16550# Department of Energy, Bartlesville, Okla.
TRENDS IN MOTOR GASOLINES, 1942 - 1981
Ella Mae Shelton, M. L. Whisman, and Paul W. Woodward Jun. 1982 31 p refs
(DE82-021124; DOE/BETC/RI-82/4) Avail: NTIS HC A03/MF A01

Trends in motor gasolines were evaluated based upon data contained in surveys. These surveys describe the properties of motor gasolines from throughout the country. Various companies obtain samples from retail outlets, analyze the samples by the American Society for Testing and Materials (ASTM) procedures, and report the data for compilation, tabulation, calculation, analysis and publication. A typical motor gasoline report covers 2400 samples from service stations throughout the country representing some 48 companies that manufacture and supply gasoline. The reports include trend charts, octane plots, and tables of test results from about a dozen different tests. From these data, a summary report was assembled that shows trends in motor gasolines. Trends of physical properties including octane numbers, antiknock ratings, distillation temperatures, Reid vapor pressure, sulfur and lead content are tabulated, plotted and discussed. Trend effects of technological advances and the interactions of engine design, societal and political events and prices upon motor gasoline evolution are included. DOE

N83-16551# Mason and Hanger-Silas Mason Co., Inc., Amarillo, Tex.
THERMAL PURIFICATION OF TATB CONTAINING CHLORONITROBENZENES
J. Greg Locke and W. Tim Quinlin Sep. 1982 6 p ref
(Contract DE-AC04-76DP-00487)
(DE82-022475; MHSMP-82-31) Avail: NTIS HC A02/MF A01

Three different processes for thermally removing chloronitrobenzene impurities from TATB were investigated. The three investigated processes are: (1) oven drying; (2) hot water digestion in a reactor; and (3) stream stripping in a plate and frame filter press. Each was found to reduce impurity concentrations to acceptable levels. Oven drying is used to recover approximately 21,000 kilograms of TATB. DOE

N83-16552# Mason and Hanger-Silas Mason Co., Inc., Amarillo, Tex.
EFFECT OF DRYING CONDITIONS ON THE MOISTURE CONTENT OF PBX 9502
Rick J. Copeland Sep. 1982 7 p refs
(Contract DE-AC04-76DP-00487)
(DE82-022476; MHSMP-82-32) Avail: NTIS HC A02/MF A01

The moisture content of PBX 9502 powder and pressed pellets was investigated following drying temperatures of 80 C, 100 C and 120 C for times of 24, 48 and 72 hr. The optimum drying conditions (lowest moisture content) for the powder were determined to be 100 C for 24 hr. Pellets were pressed from PBX 9502 starting material and dried at these optimum conditions. A moisture content decrease from 0.132% to 0.113% was observed for the pellets using the Karl-Fischer technique. A much larger change (0.112% to 0%) was observed for the loose powder under the same drying conditions. This suggests that the conditions surrounding the pressing process are at least as important as the actual drying conditions for the powder before pressing. DOE

N83-16553# Institute of Gas Technology, Chicago, Ill.
COAL GASIFICATION FOR STATIONARY GAS-TURBINE APPLICATIONS
Anil Goyal, Donald K. Fleming, and Wilford G. Bair 1981 25 p refs Presented at the ASTM Symp. on Alternative Fuels and Future Fuels Specifications for Stationary Gas Turbine Appl., Phoenix, Ariz., 9-10 Dec. 1981
(DE82-902135; CONF-811220-1) Avail: NTIS HC A02/MF A01

Various types of coal gasification processes which are available commercially or are in the developmental stages are reviewed. The properties of the gaseous fuels produced by different gasifiers are discussed. Gas clean-up systems, adaptable for turbine applications, are presented, and factors influencing process selection are outlined. DOE

N83-16554# TRW, Inc., Redondo Beach, Calif.
GRAVIMELT PROCESS DEVELOPMENT Quarterly Technical Progress Report
18 Nov. 1981 30 p
(Contract DE-AC22-81PC-42295)
(DE82-003018; DOE/PC-42295/T1; TRW-SN-37707-6003-UT-00) Avail: NTIS HC A03/MF A01

Experiments were instituted in support of a continuous bench scale unit for coal leaching. These experiments (conducted at 350 C) were two runs in a 3 in. dia reactor, using NaOH/KOH melt and Kentucky No. 11 coal, and three runs in the TRW large Gravimelt reactor. Results show that semi-continuous addition of coal and removal of coal samples gives product coal showing the expected trend of increased removal with time and smaller particle size. The design basis and flow diagram of the bench scale continuous leacher are given. DOE

N83-16555# Pacific Northwest Lab., Richland, Wash.
ECOLOGICAL FATE AND EFFECTS OF SOLVENT-REFINED-COAL (SRC) MATERIALS Status Report
John A. Strand, III, ed. and Burton E. Vaughan, ed. Oct. 1981 218 p refs
(Contract DE-AC06-76RL-01830)
(DE82-004030; PNL-3819) Avail: NTIS HC A10/MF A01

Non-occupational health effects associated with SRC operation will be determined by environmental factors governing the form, transport, and persistence of SRC materials and wastes - factors which also mediate exposure to man. Accordingly, the research described is an attempt to determine the fate of disposed solid wastes and spilled SRC materials, and it necessarily focuses on water soluble, persistent materials with greatest potential for mobility and incorporation into water and food supplies. Initially, aqueous equilibrations of SRC-II liquid material and SRC-I nongasified mineral residue were subjected to chemical characterization. Subsequently, laboratory studies were performed on the interaction of aqueous equilibrates of SRC-II liquid and SRC-I non-gasified mineral residue with soil materials isolated suspended sediments, and bottom sediments. These studies were designed to identify effects of specific sorption reactions ion or induced-ion exchange reactions, and toxicity of water soluble, biologically active materials derived and solid wastes. DOE

N83-16556# Mound Lab., Miamisburg, Ohio.
MASS BALANCE RESULTS FOR THE PRICETOWN 1 UNDERGROUND COAL GASIFICATION FIELD TEST
A. K. Agarwal, P. W. Seabaugh, and R. E. Zielinski 1981 160 p refs
(Contract DE-AC04-76DP-00053)
(DE82-005667; NLH-NU-81-72-0002) Avail: NTIS

HC A08/MF A01

A mass balance model was applied to the Pricetown 1 test data. This model provided values of various parameters such as water influx, percent gasification, amount of coal affected, thermal efficiency, etc., for the various phases of the test. Both hourly and daily values of the test data were used. At certain times, there was air loss to the coal seam or air gain from the coal seam as related to the underground reactor. Mass balances were modified accordingly. Realistic pyrolysis temperatures were chosen for the different phases of the test based on the thermocouple responses. The nitrogen and argon balances provided similar results. The mass balance results showed that approximately 702 tons of coal were affected during the test. Approximately 266 tons of coal were completely gasified. The reverse combustion linkage through the virgin coal seam was dominated by the devolatilization and accounted for approximately 80% devolatilization whereas only 26% devolatilization occurred during the gasification phase. DOE

N83-16557# Pacific Northwest Lab., Richland, Wash.
STEAM GASIFICATION OF WOOD IN THE PRESENCE OF CATALYSTS
D. H. Mitchell, L. K. Mudge, and E. G. Baker 1981 29 p refs Presented at the 13th Biomass Thermochemical Conversion Contractors' Meeting, Arlington, Va., 27-30 Oct. 1981
(Contract DE-AC06-76RL-01830)
(DE82-005919; PNL-SA-9954; CONF-8110115-4) Avail: NTIS HC A03/MF A01

Catalytic steam gasification of wood, including sawdust, chipped forest slash, and mill shavings, is discussed. Results of laboratory, process development unit (PDU), and feasibility studies illustrate attractive processes for conversion of wood to methanol and a substitute natural gas (SNG). Recent laboratory studies developed a long lived alloy catalyst for generation of a methanol synthesis gas by steam gasification of wood. Modification of the PDU for operation at 10 atm (150 psia) is nearly complete. The modified PDU will be operated at the elevated pressure to confirm yields and design parameters used in process feasibility studies. Feasibility studies were completed on wood to methane (SNG) and wood to methanol plants with capacities of 2000 and 200 oven dried tons (1800 and 180 metric t) per day using catalytic gasification. The results showed that generation of methanol on the large scale is economically viable today while SNG generation is competitive with future prices. DOE

N83-16558# Oak Ridge National Lab., Tenn.
DYNAMIC MODELING AND CONTROL ANALYSIS OF FROTH FLOTATION AND CLEAN-COAL FILTRATION AS APPLIED TO COAL BENEFICIATION
G. S. Canright, C. H. Brown, Jr., G. O. Allgood, and W. R. Hamel Nov. 1981 114 p refs
(Contract W-7405-eng-26)
(DE82-004555; ORNL/TM-8015) Avail: NTIS HC A06/MF A01

Dynamic models were developed for coal beneficiation plant froth flotation and vacuum disk filtration processes to perform comparative analyses of manual and automatic control techniques and to determine if implementation of automatic control would be cost effective. The froth cell simulator was based on a tank-in-series model utilizing first-order flotation kinetics. The vacuum disk filter model was based on classical representations of tank mixing, filtration, and drying. Both models were implemented on the Continuous Systems Modeling Program on the IBM-360 computer system. Three types of control were implemented on the froth flotation simulator: a manual operator control, fixed reagent flow-rate control, and automatic feedforward control. Results indicate a definite economic incentive for implementation of automatic control in these flotation units. Calculated payout times for a physical system range from 5 months to 2 years, depending on the frequency of the disturbance and the cost of coal. DOE

N83-16559# Parsons (Ralph M.) Co., Pasadena, Calif.
PROCESS ENGINEERING AND MECHANICAL DESIGN REPORTS. VOLUME 1: PRELIMINARY DESIGN AND ASSESSMENT OF A 50,000 BPD COAL-TO-METHANOL-TO-GASOLINE PLANT
Washington DOE Aug. 1982 378 p Prepared in cooperation with W. R. Grace and Co., Memphis, Tenn. 5 Vol.
(Contract DE-FC02-80ET-14759)
(DE83-000848; DOE/ET-14759/T1-Vol-1) Avail: NTIS HC A17/MF A01

The process engineering and mechanical design of a 50,000 bpd coal to methanol to gasoline plant is discussed. The plant is designed to produce 50,000 bpd of high octane, unleaded gasoline utilizing approximately 25,300 tpd (exclusive of steam generation which requires 2400 tpd of coal) of high sulfur agglomerating coal having characteristics comparable to that found in the West Kentucky No. 9 seam. In addition to the primary production of gasoline, significant by products include liquefied petroleum gas (LPG), elemental sulfur, anhydrous ammonia, and isobutane. The facility is sited on land located in the vicinity of Baskett, Kentucky, in Henderson County and allows for direct utilization of extensive environmental baseline data and geotechnical data developed. The plant site consists of approximately 3170 acres of moderately hilly terrain with a barge slip designed on the Green River for receipt of raw materials and the shipment of products and by products. DOE

N83-16560# Southern California Edison Co., Rosemead. Research and Development Div.
INVESTIGATION OF METHANOL AS A BOILER FUEL FOR ELECTRIC-POWER GENERATION Final Report
A. Weir, Jr., W. H. vonKleinSmid, E. A. Danko, and N. J. Kertamus Aug. 1982 208 p refs
(EPRI Proj. 1412-11)
(DE82-905495; EPRI-AP-2554) Avail: NTIS HC A10/MF A01

A series of combustion tests were made with methanol in a 44.5 MW power boiler to evaluate gaseous emissions and boiler performance. Parallel combustion tests with fuel oil and natural gas provided a basis for comparing the results. Approximately 406,000 gallons of methanol were burned in Boiler 4 of Southern California Edison's Highgrove Generating Station, located in Grand Terrace, California, from February 17 to May 15, 1981. Methanol proved to be an acceptable fuel in terms of its handling and firing characteristics. The slightly higher heat rate and limited derating were judged to be minor disadvantages in the use of methanol. In fact, the derating with methanol was unique with the balanced draft boiler as tested. A striking reduction in the NO/sub x/ emissions of nearly 60% was observed compared to fuel oil and natural gas. The addition of water to methanol caused an additional reduction of NO/sub x/. At present, the use of methanol is not practical in the utility industry. Reliable quantities of methanol, at prices competitive with the costs of conventional fuel, are not currently available. DOE

N83-16561# Engineering Societies Library, New York.
ADVANCED COAL PREPARATION Final Technical Report
1981 32 p Presented at the Advanced Coal Preparation Conf., Henniker, N.H., 2-7 Aug. 1981
(Contract DE-FG22-81PC-42294)
(DE82-010502; DOE/PC-42294/T1; CONF-8108116) Avail: NTIS HC A03/MF A01

The 1981 Advanced Coal Processing Engineering Conference evaluated the current state of the art of commercial coal preparation practice and new results. It emphasized a strong practical flavor that scrutinized commercial practice and ferreted out those aspects of various unit operations that presented problems of either a technical or economic nature. Emphasis was placed on the design of advanced coal preparation circuits and new technology needs. New developments and needs in the conventional coal cleaning processes such as heavy media, cycloning, tabling, and flotation were addressed. New approaches in comminution, sizing, dewatering, and tailings disposal were also discussed. Because of the environmental and energy problems, a revolution is taking place in the physical beneficiation of coal technology, spurred by necessity and advancing on the developments of engineering science. DOE

N83-16562# Southwest Research Inst., San Antonio, Tex.
NONSTANDARD AGING TESTS ON COAL-DERIVED DISTILLATE FUELS Technical Progress Report, 7 Jul. 1981 - 6 Jan. 1982
John N. Bowden 6 Feb. 1982 9 p
(Contract DE-AC22-81PC-10442)
(DE82-010442; DOE/PC-41755/7) Avail: NTIS HC A02/MF A01

The purpose was to evaluate the stability of coal derived liquid fuels and to provide samples of aged synfuels and deposits formed during aging for detailed characterization. An H-coal derived naphtha and a middle distillate were obtained for testing. A 50/50 blend of solvent refined coal 2 (SRC-2) and a petroleum based naphtha was supplied for the storage test. The four week aging data for H-coal naphtha and middle distillate in air and in nitrogen are presented along with their properties in tables. The aging procedure is still underway for the 50/50 blend of SRC-2 naphtha and petroleum based naphtha. DOE

N83-16563# California Univ., Livermore. Lawrence Livermore Lab.
COAL AS AN OPTION FOR POWER GENERATION IN US TERRITORIES OF THE PACIFIC
I. Y. Borg 30 Nov. 1981 28 p refs
(Contract W-7405-eng-48)
(DE82-009462; UCRL-53236) Avail: NTIS HC A03/MF A01

A survey of general considerations relating to the use of coal in US territories and trust territories of the Pacific suggests that coal is a viable option for power generation. Future coal supplies, principally from Australia and the west coast of America, promise to be more than adequate, but large bulk carriers will probably not be able to land coal directly because of inadequate port facilities. Hence, smaller than Panamax-class vessels (60,000 dwt) or some arrangement utilizing self-loading barges or lighters would have to be used. Except for Guam, with peak power requirements on the order of 175 MW sub e, most territories have current, albeit inadequate, installations of 1 to 25 MW sub e. Turnkey, conventional coal-fired, electric-power generating systems are available in that size range. US environmental laws are now applicable to Guam and American Samoa; the trust territories are exempt. DOE

N83-16564# Transamerica Delaval, Inc., Oakland, Calif. Engine and Compressor Div.
EMULSIFIED FUEL TESTING IN A MEDIUM SPEED DIESEL ENGINE Final Report, Feb. 1981 - Apr. 1982
J. J. Barich, T. L. Hinrichs, and K. R. Pearce Washington Maritime Administration Jun. 1982 137 p
(Contract MA-80-SAC-01059)
(PB82-250697; MA-RD-920-82069; Rept-019-028) Avail: NTIS HC A07/MF A01 CSCL 21D

Medium speed diesel engine testing of fuel water emulsification with various grades of diesel fuel was conducted in order to determine the effect of water emulsification on engine performance. Emulsions from 0 to 12% water (by volume) were test run with various water particle sizes, injection timings, and engine loads with four separate fuels: Marine diesel, 1500 SR1, 3500 SR1, and 5000 SR1. Experimental results are presented for the basic engine performance areas for the various conditions run, focusing mainly on the effects of water emulsification on fuel consumption, exhaust emisssions, and engine component wear rates. Details of the emulsification system are also discussed. GRA

N83-16565# Texas A&M Univ., College Station.
THERMODYNAMIC PROPERTIES FOR NATURAL GAS BINARIES Final Report, 1 Dec. 1980 - 31 Dec. 1981
Kenneth R. Hall and James C. Holste Jan. 1982 19 p Sponsored in part by Gas Research Inst.
(PB82-254616) Avail: NTIS HC A02/MF A01 CSCL 21D

The report describes experimental measurements of dew and bubble points for a CO2-C2H6 mixture and for CO2 containing small amounts of methane and/or nitrogen. The apparatus is a Burnett isochoric PVT device. Experimental technique improvements allow accurate determination of the phase boundaries. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N83-16566# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
PREDICTION OF PAVEMENT ROUGHNESS Final Report
Walter R. Barker Sep. 1982 91 p refs
(DA Proj. 4A1-61101-A-910)
(AD-A120009; WES/MP-GL-82-11) Avail: NTIS HC A05/MF A01 CSCL 13/13

A simplified procedure has been developed for considering roughness in pavement design. The procedure utilizes statistical parameters to generate stochastic pavement material properties and profiles. A methodology was developed for predicting the rutting of a pavement section due to applied traffic. Thus the predicted rut depth can be applied to the profiles yielding a predicted surface profile. This profile can then be used to determine a measure of pavement roughness. Author (GRA)

N83-16567# Oak Ridge National Lab., Tenn. Engineering Technology Div.
CONTINUOUS SEPARATION OF DRY CRUSHED COAL AT ONE TON PER HOUR BY HIGH-GRADIENT MAGNETIC SEPARATION
E. C. Hise, I. Wechsler, and J. M. Doulin Dec. 1981 58 p
(Contract W-7405-eng-26)
(DE82-004654; ORNL-5763) Avail: NTIS HC A04/MF A01

The separation of pyritic sulfur and ash forming minerals from dry crushed coal in a small, cyclic, high gradient magnetic separator over a range of each of the process parameters was tested. A band of operating conditions that affected reductions of the mineral contaminants and recoveries of the heating value comparable to gravimetric separations was defined. The procedures and results of an experimental program to extrapolate from the small, cyclic separations to continuous, pilot scale separation at a feed rate of 1 ton/h are described. The program testing magnetic preparation of dry crushed coal has demonstrated that: (1) dry crushed coal in the size range of about 600 x 45 microns can be effectively cleaned by magnetic separation techniques; (2) product quality and heating value recovery by the high gradient magnetic process approaches that obtained by a laboratory gravimetric separation of the same size fraction; and (3) separations performed on size fractions from 600 to 45 microns at a feed rate of 1 ton/h in a continuous, industrial type high gradient magnetic separator equal those obtained in a cyclic laboratory separator. DOE

N83-16568# Oak Ridge National Lab., Tenn.
INDUSTRIAL SAFETY AND APPLIED HEALTH PHYSICS Annual Report, 1980
J. A. Auxier and D. M. Davis Nov. 1981 133 p
(Contract W-7405-eng-26)
(DE82-002818; ORNL-5821) Avail: NTIS HC A07/MF A01

Information is reported in sections entitled: radiation monitoring; Environmental Management Program; radiation and safety surveys; industrial safety and special projects; Office of Operational Safety; and training, lectures, publications, and professional activities. There were no external or internal exposures to personnel which exceeded the standards for protection as defined in DOE Manual Chapter 0524. Only 35 employees received whole body dose equivalents of 10 mSv (1 rem) or greater. There were no releases of gaseous waste from the Laboratory which were of a level that required an incident report to DOE. There were no release of liquid radioactive waste from the Laboratory which were of a level that required an incident report to DOE. The quantity of those radionuclides of primary concern in the Clinch River, based on the concentration measured at White Oak Dam and the dilution afforded by the Clinch River, averaged 0.16 percent of the concentration guide. DOE

N83-16569# Brookhaven National Lab., Upton, N. Y.
DESIGN AND CONSTRUCTION OF A DEMONSTRATION RESI-

DENCE UTILIZING NATURAL THERMAL STORAGE
Ralph F. Jones and Homayoun T. Ghaffari 1981 8 p refs Presented at the Solar World Forum, Brighton, England, 23-28 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE82-005508; BNL-30267; CONF-810865-7) Avail: NTIS HC A02/MF A01

The Brookhaven House is an energy conserving residence which demonstrates how thermal mass combined with solar energy can be used to reduce heating costs in a conventional single family house. The purpose of the project was to develop a prototypical house design that could result in immediate energy savings by being an acceptable, attractive design to developers, builders, and home buyers. Investigations were limited to only materials and methods of construction that were considered presently available and of Natural Thermal Storage design. Natural thermal storage is simply the heat storage obtained through architectural application of massive building materials integrated into the living space and structure of a residence. It has been concluded that relatively thin mass walls of masonry directly irradiated through a multiglazed south facing aperture can significantly reduce annual heating requirements. DOE

N83-16570# California Univ., Berkeley. Lawrence Berkeley Lab.
TWOZONE USERS MANUAL
A. J. Gadgil, G. Gibson, and A. H. Rosenfeld Oct. 1981 123 p refs
(Contract W-7405-eng-48)
(DE82-005143; LBL-6840-Rev) Avail: NTIS HC A06/MF A01

TWOZONE, written in the summer of 1975, analyzes the heating and cooling loads of single family residences for the purpose of investigating the effect on energy consumption of various changes in building design, construction and management. The program evaluates the annual energy demand taking into account (1) various amounts, types, and locations of glass areas in a house; (2) different wall and roof constructions; (3) various amounts and locations of insulation; (4) scheduled thermostat settings; (5) other changes in the building envelope. The model differentiates between the thermal behavior of the north and south zones of a house. (Hence the name TWOZONE). Advantages and disadvantages, the input deck, the output, and a sample output are discussed. A dictionary of variables for TWOZONE, important variables in TWOZONE subroutines and functions, and subroutine and function program descriptions are included. DOE

N83-16571# Los Alamos Scientific Lab., N. Mex.
COMPUTATIONAL EXPERIENCES WITH VARIABLE MODULUS, ELASTIC-PLASTIC AND VISCOELASTIC CONCRETE MODELS
C. A. Anderson 1981 23 p Presented at the Workshop on Constitutive Relations for Concrete, Albuquerque, N. Mex., 28-29 Apr. 1981
(Contract W-7405-eng-36)
(DE82-004363; LA-UR-81-3509; CONF-8104129-1) Avail: NTIS HC A02/MF A01

The development of a comprehensive concrete structural analysis code to predict the static and dynamic behavior of prestressed condcrete reactor vessels (PCRVs) that serve as the containment structure of a high temperature gas cooled reactor is discussed. The PCRV is a complex concrete structure that must be modeled in three dimensions and posseses other complicating features such as a steel liner for the reactor cavity and woven cables embedded vertically in the PCRV and wound circumferentially on the outside of the PCRV. The cables, or tendons, are used for prestressing the reactor vessel. In addition to developing the computational capability to predict inelastic three dimensional concrete structural behavior, the code response was verified against documented experiments on concrete structural behavior. DOE

N83-16572# Oak Ridge National Lab., Tenn. Chemical Technology Div.
SASOL: THE COMMERCIAL EXPERIENCE. AN EXECUTIVE SUMMARY
F. M. OHara, Jr. Feb. 1982 8 p
(Contract W-7405-eng-26)
(DE82-011304; ORNL/TM-8163) Avail: NTIS HC A02/MF A01

The design and operation of Sasol, the South African Fischer-Tropsch coal liquefaction operation is described. Sasol produces gasoline, fuel gas, asphalt, industrial chemicals, fertilizers, and waxes. The product slate is changed to match market demands by altering the plants; operating conditions. DOE

N83-16573# Oak Ridge National Lab., Tenn.
PART-SUPPORT STUDIES FOR DIAMOND-MACHINING MIRRORS
S. C. Robinson and H. L. Gerth (Tennessee Univ., Knoxville) Feb. 1982 18 p
(Contract W-7405-eng-26)
(DE82-008381; Y-2268) Avail: NTIS HC A02/MF A01

Four methods of part support for holding metal mirrors during diamond machining were studied. These methods were: (1) clamping to the edge of the mirror, (2) supporting the mirror in a rubber potting compound, (3) holding by vacuum, and (4) supporting by using a three-point hard-bolted mount. It is indicated that the three-point support, when used with suitable machining parameters, was the most satisfactory for fabricating a large number of mirrors. DOE

N83-16574# Bendix Corp., Kansas City, Mo. Technical Communications.
COPPER PYROPHOSPHATE/PY61H PLATING BATH: CONTROL OF AMMONIA
K. J. Borhani Feb. 1982 27 p refs
(Contract DE-AC04-76DP-00613)
(DE82-008078; BDX-613-2751) Avail: NTIS HC A03/MF A01

Methods of ammonia anaysis are analyzed, and the requirements for control of ammonia in copper pyrophosphate/PY61H plating baths are identified. Printed wiring boards plated in copper pyrophasphate/Py61H baths are utilized in numerous programs. Standard bath solutions of the same ammonia concentration but varying concentrations of copper, pyrophosphate, and brightener (PY61H) were analyzed by three methods: Kjeldahl distillation/titration, hexamethylene tetramine titration, and the ammonia gas-sensing electrode. All three analytical techniques demonstrated the independence of ammonia concentration with changing bath composition. Standard deviations of +-0.003 N, +-0.025 N, and +-0.005 N, respectively, were observed. DOE

N83-16575# Oxford Univ. (England). Engineering Lab.
A UNIFORM INPUT DATA CONVENTION FOR THE CALL 3-D CRASH VICTIM SIMULATION
S. J. Shaibani Jul. 1982 6 p ref
(OUEL-1419/82) Avail: NTIS HC A02/MF A01

Logical schemes for the labelling of planes (cards D) and functions (cards E) in the input decks used for the Calspan 3-D Crash Victim Simulation (CVS) program are proposed. One benefit of introducing such a standardized format for these inputs would be to facilitate greatly the interchange of data for different vehicles. A further advantage would be that the table of allowed contacts (cards F) could remain largely unaltered. It is hoped that the uniformity of the convention described by these schemes would help to promote the exchange of readily usable data between CVS users. Author (ESA)

N83-16576# Oxford Univ. (England). Engineering Lab.
APPLICATION OF THE CAL 3-D CVS PROGRAM TO EVALUATE THE EQUILIBRIUM POSITION OF AN EULER-JOINTED ALDERSON PART572
S. J. Shaibani Aug. 1982 6 p ref
(OUEL-1426/82) Avail: NTIS HC A02/MF A01

The adaptation of the Cal 3-D crash victim simulation program in its version 20A form to a Vax 11/780 computer is described. The effectiveness of the modifications is demonstrated by using the program to seat a Euler-jointed Alderson Part 572 dummy with the equilibrium subroutine. The resulting segment linear

acceleration values of .09 g or better indicate that the dummy can be considered to be in equilibrium. Author (ESA)

N83-16577# Transport and Road Research Lab., Crowthorne (England). Tunnels and Underground Pipes Div.
THE BRITISH SOIL CLASSIFICATION SYSTEM FOR ENGINEERING PURPOSES: ITS DEVELOPMENT AND RELATION TO OTHER COMPARABLE SYSTEMS Final Report
M. J. Dumbleton Dec. 1981 32 p refs
(PB82-253287; TRRL-LR-1030; ISSN-0305-1293) Avail: NTIS HC A03/MF A01 CSCL 08M

The British Soil Classification System (BSCS) which was introduced in the British Standard Code of Practice for Site Investigations, BS 5930:1981 is reviewed. An account is given of the development of the BSCS from the previous British system of CP 2001; the reasons for changes are explained, and comparison is made with similar systems in use in America, France, Germany, Switzerland, and Japan. New features of the system are that it is metricated, its groups are fully defined, description of the grading of coarse materials is improved, fuller description is possible of coarse soils containing an appreciable proportion of fines and of fine soils containing an appreciable proportion of gravel or sand, the classification of fine soils is extended to provide for materials of very high and extremely high plasticity, the presence of organic matter can be indicated in any type of soil, and materials containing boulders and cobbles can be classified. GRA

N83-16578# Purdue Univ., Lafayette, Ind. Joint Highway Research Project.
STRENGTH OF FIELD COMPACTED CLAYEY EMBANKMENTS Interim Report
Y. Liang and C. W. Lovell 2 Feb. 1982 250 p refs Sponsored by Federal Highway Administration and Indiana Dept. of Highways
(PB82-257122; JHRP-82-1; FHWA/IN/JHRP-82/1) Avail: NTIS HC A11/MF A01 CSCL 08M

The shearing behavior of a plastic Indiana clay (St. Croix) was studied for both laboratory and field compaction. This interim report deals with the field compacted phase. The strength tests were performed by unconsolidated undrained (UU) and saturated consolidated undrained (CIU) triaxials. These were run at various confining pressures to approximate the end of construction and long term conditions at several embankment depths. GRA

N83-16579# Technical Planning, Inc., Beltsville, Md.
NATIONAL BUREAU OF STANDARDS PASSIVE SOLAR TEST BUILDING HANDBOOK Final Report
Keith W. Lindler Aug. 1982 56 p ref Sponsored by NBS and DOE
(PB82-265380; TPI-SR-82-05; NBS-GCR-82-398) Avail: NTIS HC A04/MF A01 CSCL 13M

The passive solar test building was constructed for the class A Passive Solar Program. The test building is located in Gaithersburg, Maryland (39.0 deg n latitude, 77.3 deg W longitude) at an elevation of 417 ft. The handbook provides a complete physical description of the building including floor plans and dimensions, structure, wall cross sections, and material properties. The location of various sensors installed in and around the building is also provided. GRA

N83-16580# Najarian, Thatcher and Associates, Closter, N.J.
LAGRANGIAN TRANSPORT IN ESTUARIES AND SEA-LEVEL CANALS Final Report
Tavit O. Najarian, Dong-Ping Wang, and Po-Shu Huang Jun. 1982 67 p refs
(PB82-262528; PPSP/PPRP-69) Avail: NTIS HC A04/MF A01 CSCL 13B

The results of a study conducted to develop a model for measurement of tide-induced and density-induced Lagrangian currents by measuring parameters which act on the currents in an estuary are discussed. A two-dimensional (in a vertical plane) nonlinear model was modified to simulate mean Eulerian and Stokes velocities in tidal waters. The model is verified by comparing its results with known analytical solutions of Lagrangian currents in a homogeneous estuary. A set of model experiments is performed to investigate the influences of tidal forcing, density gradients, and topographic variations on the mean Lagrangian currents in an estuary. The verified model is then applied to the Chesapeake and Delaware Canal, which is forced by tides of differing amplitudes and a phase difference at its extremities. GRA

N83-16581# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Civil Engineering.
PROBABILISTIC SAFETY ANALYSIS OF EARTH RETAINING STRUCTURES DURING EARTHQUAKES
D. A. Grivas and C. Souflis Jul. 1982 150 p refs
(Grant NSF PFR-79-05500)
(PB82-262593; CE-82-9; NSF/CEE-82030) Avail: NTIS HC A07/MF A01 CSCL 13B

A procedure is presented for determining the probability of failure of Earth retaining structures under static or seismic conditions. Four possible modes of failure (overturning, base sliding, bearing capacity, and overall sliding) are examined and their combined effect is evaluated with the aid of combinatorial analysis. The probability of failure is shown to be a more adequate measure of safety than the customary factor of safety. As Earth retaining structures may fail in four distinct modes, a system analysis can provide a single estimate for the possibility of failure. A Bayesian formulation of the safety retaining walls is found to provide an improved measure for the predicted probability of failure under seismic loading. The presented Bayesian analysis can account for the damage incurred to a retaining wall during an earthquake to provide an improved estimate for its probability of failure during future seismic events. Author (GRA)

N83-16582# Cheng (David H.), Teaneck, N.J.
AERODYNAMIC STABILITY OF LONG COLUMNS WITH ELASTIC END CONSTRAINTS Final Report
David H. Cheng Washington Federal Highway Administration Feb. 1982 81 p
(Contract DTFH61-81-P-30062)
(PB82-258203; FHWA/RD-81/133) Avail: NTIS HC A05/MF A01 CSCL 13B

A method for calculating fundamental frequencies and predicting wind induced responses of long, slender bridge members is presented. The method is illustrated through use of practical examples and predictions are compared with field measurements. It will be of interest to bridge engineers and researchers involved in the analysis, design, and construction of large bridge structures which contain these members. GRA

N83-16583# Brown and Caldwell, Walnut Creek, Calif.
APPLICATION OF OZONE TO ELIMINATE TERTIARY TREATMENT OF WASTEWATER USED FOR INDUSTRIAL COOLING Final Technical Report
Douglas T. Merrill and Denny S. Parker Feb. 1982 61 p refs
(Contract DI-14-34-0001-9413)
(PB82-256835; W82-06709; OWRT-C-90070-R(9413)(1)) Avail: NTIS HC A04/MF A01 CSCL 13A

The beneficial performance of ozone (biofouling, corrosion, and chemical scaling control), when used as the sole source of cooling water treatment for air conditioning systems, could be obtained at higher cooling water temperatures typical of industrial cooling with secondary municipal effluent (SME) used as the cooling medium was investigated. A pilot cooling system was constructed and a 6 month experimental study initiated to determine process limits, mechanisms of scaling inhibition by ozone, and to evaluate factors influencing technical/economic feasibility. It was found that, while ozone use adequately controlled corrosion and biofouling, chemical scaling could not be prevented at conditions necessary for significant economic justification. Calculations indicate that the makeup waters (SME) used will become saturated with respect to calcium phosphate at less than 2 cycles of concentration, hence, a scaling potential exists at conditions less stringent than those used in the present study. GRA

N83-16584# Mississippi State Highway Dept., Jackson. Research and Development Div.
CONTINUOUSLY REINFORCED CONCRETE OVERLAY OF EXISTING CONTINUOUSLY REINFORCED CONCRETE PAVEMENT Interim Report
Alfred B. Crawley Mar. 1982 98 p refs
(PB82-252073; MSHD-RD-82-074-1; FHWA-MSHD-RD-82-074-1) Avail: NTIS HC A05/MF A01 CSCL 13B

The design and construction of a 6 inch thick unbonded continuously reinforced concrete (CRC) overlay of a 20 year old continuously reinforced concrete pavement (CRCP) are described. Crack surveys for the first nine months after construction are included. GRA

N83-16585# Transport and Road Research Lab., Crowthorne (England).
EPOXY COATED REINFORCEMENT IN BRIDGE DECKS Interim Report
J. Wills 1982 30 p refs
(PB82-254293; TRRL/SR-667; TRRL-SUPPLEMENTARY-667; ISSN-0305-1315) Copyright. Avail: NTIS HC A03/MF A01 CSCL 13M

A review was conducted of methods relating to the use of epoxy coated reinforcing bars for bridge decks and their potential for use in the United Kingdom. A survey of work carried out in the USA was carried out and the analysis used in a preliminary cost study. The options of having either a hot rolled asphalt surfacing or a permanently exposed concrete wearing surface were considered. It was concluded that epoxy coating of the top steel in addition to current waterproofing practice would provide, at relatively little extra cost, additional assurance that the reinforcement would be adequately protected throughout the life of a bridge. Current design rules do not permit decks with permanently exposed concrete wearing surface without waterproofing. Epoxy coating may afford a means of introducing such decks but before a positive recommendation to delete waterproofing can be made further studies would have to be undertaken. GRA

N83-16586# Massachusetts Inst. of Tech., Cambridge. Div. of Constructed Facilities.
DYNAMIC STIFFNESS AND SEISMIC RESPONSE OF PILE GROUPS
Amir M. Kaynia and Eduardo Kausel Jan. 1982 131 p refs
(Grant NSF PFR-79-02989)
(PB82-249012; MIT-CE-R82-03; NSF/CEE-82023) Avail: NTIS HC A07/MF A01 CSCL 13B

A formulation for the analysis of pile groups in layered semi-infinite media is presented. The formulation is based on the introduction of a soil flexibility matrix as well as on dynamic stiffness and flexibility matrices of the piles to relates the discretized uniform forces to the corresponding displacements at the pile-soil interface. Pile group analyses revealed that behavior is highly frequency dependent as the result of wave interferences occurring between the various piles in the group. Large values for stiffnesses as well as large magnification factors for the groups essentially follow the low frequency components of the ground motion. The rotational component is negligible for typical dimensions of the foundation. Author (GRA)

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N83-16587 British Broadcasting Corp., Kingswood (England). Engineering Div.
A PROBABILITY DISTRIBUTION ANALYSER FOR TV SIGNALS
S. T. Glass Nov. 1982 10 p refs
(BBC-RD-1982/20) Copyright. Avail: Issuing Activity

A signal analyzer is described which measures the probability distribution function of digital video signals and displays it on an oscilloscope. Experiments conducted to compare the performance of two different predictors for use in a differential pulse code modulation coder are considered. The use of the analyzer in conjunction with video noise reduction equipment to measure the noise power in a stationary picture is also reported. A.R.H.

N83-16588 British Broadcasting Corp., Kingswood (England). Engineering Div.
BROADCAST TELEPHONE SPEECH: USE OF SPEECH SYNTHESIS TO EXTEND THE AUDIO BANDWIDTH
P. S. Gaskell, W. I. Manson, and T. A. Moore Nov. 1982 14 p refs
(BBC-RD-1982/21) Copyright. Avail: British Broadcasting Corp., Kingswood Warren, Tadworth, Surrey, England

The quality of telephone speech for broadcasting, primarily with the phone-in type of program in mind, was studied. Author

N83-16589 British Broadcasting Corp., Kingswood (England). Engineering Div.
DIGITAL AUDIO: COPAS-2 A MODULAR DIGITAL AUDIO SIGNAL PROCESSOR FOR USE IN A MIXING DESK
G. W. McNally Aug. 1982 18 p refs
(BBC-RD-1982/13) Avail: Issuing acitivity

A digital signal processor for high quaity audio signals is described. Hardware and system aspects of such processing are considered with special attention to a second generation design known as COPAS-2. This processor was optimized for applications in recursive digital filtering and dynamic range control. S.L.

N83-16590 British Broadcasting Corp., Kingswood (England). Engineering Div.
THE LF/MF RADIO-DATA: MUSH-AREA RECEPTION TESTS
M. E. Bailey Dec. 1982 18 p refs
(BBC-RD-1982/22) Avail: BBC, Kingswood Warren, Tadsworth, Surrey, England

Program compatibility reception tests of a proposed data transmission system for l.f. radio broadcasting are described. The tests demonstrate that the proposed system, which employs carrier phase modulation, is compatible with program reception in the 'mush areas' between co-channel, co-program stations, provided that the data signals radiated for the stations are identical and 'delay equilized' to arrive in the mush area in synchronism. Data reception tests were also carried out which indicate that if program compatibility is achieved, data reception is also feasible. Author

N83-16591 National Physical Lab., Teddington (England). Dept. of Electrical Science.
A NEW CALCULABLE R. D. AND MICROWAVE FIELD STANDARD WITH EXTREMELY BROAD BANDWIDTH: THEORY AND PRELIMINARY RESULTS
A. E. Fantom Aug. 1982 63 p refs
(NPL-DES-73; ISSN-0143-7305) Copyright. Avail: Issuing Activity

A transmission cell based on intersecting cones is presented. The cell was used to calibrate an E field radiation hazard monitor from 300 MHz to 10 GHz. Comparisons with other methods show agreement to within 25% in all cases except at 6.5 GHz. Biconical and parabolic transmission cell options are possible. Author (ESA)

N83-16592# Communications Research Centre, Ottawa (Ontario). Radar and Communications Branch.
MEASUREMENTS AT 11 AND 17 GHz OF TERRESTRIAL MICROWAVE FADING AND DEPOLARIZATION
R. S. Butler Sep. 1982 76 p refs
(CRC-1358) Avail: NTIS HC A05/MF A01

A microwave propagation experiment conducted in the 11 GHz and 17 GHz frequency ranges on two adjacent 16 km paths is discussed. Direct and cross polarized signal levels were measured for six months, and significant attenuation and depolarization were

observed during periods of rainfall as well as at certain times when the atmosphere was clear. Statistics of the durations and of the rates of change of attenuation are presented. The relation of depolarization during rainfall to the canting angles of raindrops is also discussed, and a procedure is developed by which the statistics of the canting angles are obtained. The magnitudes of attenuation during rainfall and attenuation in clear air, and of depolarization in both circumstances, are compared and assessed for their effects on microwave communication system design. S.L.

N83-16593*# Houston Univ., Tex.
FOUR FREQUENCY GROUND SCATTEROMETER
E. T. Dickerson Oct. 1982 84 p refs
(Contract NAS9-16422)
(NASA-CR-167783; NAS 1.26:167783) Avail: NTIS HC A05/MF A01 CSCL 20N

The FM-CW Radar, used as a microwave scatterometer is described. Scatterometer system design, scatterometer system calibration, parameter calculation and correction for data acquisition, ground scatterometer data acquistion at Jornada Experimental Range, and Kansas radar cross-calibration test are discussed. Author

N83-16594*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SHUTTLE IMAGING RADAR-A (SIR-A) EXPERIMENT
C. Elachi, ed. and J. B. Cimino, ed. 15 Dec. 1982 230 p refs Sponsored by NASA
(NASA-CR-169795; JPL-Pub-82-77; NAS 1.26:169795) Avail: NTIS HC A11/MF A01 CSCL 17I

The SIR-A experiment was conducted in order to acquire radar data over a variety of regions to further understanding of the radar signatures of various geologic features. The capability of the Shuttle as a scientific platform for observation of the Earth's resources was assessed. The SIR-A sensor operated nominally and the full data acquisition capacity of the optical recorder was used. S.L.

N83-16595*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SIR-B SCIENCE PLAN
1 Dec. 1982 85 p refs Sponsored by NASA Original contains color illustrations
(NASA-CR-169793; JPL-Pub-82-78; NAS 1.26:169793) Avail: NTIS HC A05/MF A01 CSCL 17I

The Shuttle Imaging Radar-B (SIR-B) will be the third in a series of spaceborne SAR experiments conducted by NASA which began with the 1978 launch of SEASAT and continued with the 1981 launch of SIR-A. Like SEASAT and SIR-A, SIR-B will operate at L-band and will be horizontally polarized. However, SIR-B will allow digitally processed imagery to be acquired at selectable incidence angles between 15 and 60 deg, thereby permitting, for the first time, parametric studies of the effect of illumination geometry on SAR image information extraction. This document presents a science plan for SIR-B and serves as a reference for the types of geoscientific, sensor, and processing experiments which are possible. Author

N83-16596*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A COMPARISON OF FRAME SYNCHRONIZATION METHODS
Laif Swanson 15 Dec. 1982 23 p refs Sponsored by NASA
(NASA-CR-169794; JPL-Pub-82-100; NAS 1.26:169794) Avail: NTIS HC A02/MF A01 CSCL 17B

Different methods are considered for frame synchronization of a concatenated block code/Viterbi link. Synchronization after Viterbi decoding, synchronization before Viterbi decoding based on hard-quantized channel symbols are all compared. For each scheme, the probability under certain conditions of true detection of sync within four 10,000 bit frames is tabulated. Author

N83-16597*# National Aeronautics and Space Administration, Washington, D. C.
TELECOMMUNICATION APPLICATIONS OF MILLIMETER WAVES
P. DuPuis Nov. 1982 23 p refs Transl. into ENGLISH from L'Onde Elec. (France), v. 61, Jun. - Jul. 1981 p 35-42 Previously announced as A81-44300 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Technical Center of Telecommunication Studies, Cotes-du-Nord, France
(Contract NASw-3541)
(NASA-TM-76989; NAS 1.15:76989) Avail: NTIS HC A02/MF A01 CSCL 17B
For abstract see A81-44300.

N83-16598*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE RADAR CROSS SECTION OF DIELECTRIC DISKS
D. M. LeVine Oct. 1982 28 p refs Submitted for publication
(NASA-TM-84930; NAS 1.15:84930) Avail: NTIS HC A03/MF A01 CSCL 17I

A solution is presented for the backscatter (nonstatic) radar cross section of dielectric disks of arbitrary shape, thickness and dielectric constant. The result is obtained by employing a Kirchhoff type approximation to obtain the fields inside the disk. The internal fields induce polarization and conduction currents from which the scattered fields and the radar cross section can be computed. The solution for the radar cross section obtained in this manner is shown to agree with known results in the special cases of normal incidence, thin disks and perfect conductivity. The solution can also be written as a product of the reflection coefficient of an identically oriented slab times the physical optics solution for the backscatter cross section of a perfectly conducting disk of the same shape. This result follows directly from the Kirchhoff type approximation without additional assumptions. Author

N83-16599# Federal Aviation Agency, Atlantic City, N.J.
OPERATIONAL AND TECHNICAL EVALUATION OF THE FULL DIGITAL AUTOMATED RADAR TERMINAL SYSTEMS (ARTS) DISPLAY (FDAD) Final Report
Robert Clark and Salvador Roditi Oct. 1982 41 p
(DOT/FAA/RD-82/51; DOT/FAA/CT-82/87) Avail: NTIS HC A03/MF A01

This report discusses the operational and technical evaluation of the Full Digital Automated Radar Terminal Systems (ARTS) Display (FDAD). The FDAD was capable of providing data entry, data display, data refresh, and input/output functions of either ARTS II, ARTS III or ARTS IIIA computer. Three different cathode ray tube phosphors, including color, were evaluated. Data were displayed either in a full digital mode or a time share mode. During the time share mode, the display of digital data was time shared with analog radar/beacon target reports. Modifications to software, hardware, and display firmware would be required to make the FDAD's operationally suitable. The technical evaluation conditionally accepts the displays, as tested, and it recommends their use as field displays, provided certain modifications are made. Author

N83-16600*# Virginia Univ., Charlottesville. Communication Systems Lab.
AN IMPROVED ALGORITHM FOR EVALUATING TRELLIS PHASE CODES
Michael G. Mulligan and Stephen G. Wilson 16 Sep. 1982 18 p refs
(Grant NAG3-141)
(NASA-CR-169354; NAS 1.26:169354) Avail: NTIS HC A02/MF A01 CSCL 20N

A method is described for evaluating the minimum distance parameters of trellis phase codes, including CPFSK, partial response FM, and more importantly, coded CPM (continuous phase modulation) schemes. The algorithm provides dramatically faster execution times and lesser memory requirements than previous algorithms. Results of sample calculations and timing comparisons are included. Author

N83-16601# Martin Marietta Aerospace, Orlando, Fla.
LOS SELECTIVE FADING AND AN/FRC-170(V) RADIO HYBRID COMPUTER SIMULATION Final Report, Feb. 1981 - Sep. 1982
M. Keith Klukis, Jerry J. Viviano, and Richard B. Wavell Sep. 1982 176 p
(Contract DCA100-81-C-0016)
(AD-A120816) Avail: NTIS HC A09/MF A01 CSCL 17/2

This report documents results of the modeling, simulation and study of the dual diversity AN/FRC-170(V) radio and frequency selective fading microwave line of sight radio channel. Both hybrid computer and circuit technologies were used to develop a fast accurate and flexible simulation tool to investigate changes and proposed improvements to the design of the AN/FRC-170(V) radio. In addition to the simulation study, a remote hybrid computer terminal was provided to DCEC for interactive study of the modeled radio and channel. Simulated performance of the radio for Rayleigh, line of sight two ray channels, and additive noise are included in the report. Author (GRA)

N83-16602# Navy Experimental Diving Unit, Panama City, Fla.
EVALUATION OF THE EFCOM SC-100M/120M/125M WIRELESS UNDERWATER COMMUNICATOR
James R. Middleton Apr. 1982 26 p refs
(AD-A119833; NEDU-1-82) Avail: NTIS HC A03/MF A01 CSCL 17/2

In June 1981, the EFCOM SC-100M/120M/125M wireless communications system was evaluated in conjunction with the AGA DIVATOR 324 Full-Face Mask by the Navy Experimental Diving Unit. The purpose was to determine the systems suitability for U.S. Navy use with open-circuit Self-Contained Underwater Breathing Apparatus (SCUBA). The EFCOM system was evaluated for intelligibility, reliability and human engineering. Author (GRA)

N83-16603# Naval Postgraduate School, Monterey, Calif.
OPTICAL SCINTILLATION ON FOLDED PATHS Ph.D. Thesis
Avihu Ze'evi Mar. 1982 110 p refs
(AD-A120359) Avail: NTIS HC A06/MF A01 CSCL 20/6

Optical scintillation on folded paths has been investigated for the case of spherical waves and a plane mirror as a folding target. A criterion for the statistical independence of the two parts of the folded path was formulated, utilizing the path integral technique and the Von Karman spectrum. Employing the same approach, an expression for the scintillation strength (the log-intensity variance) on folded paths has been developed. It has been shown that the scintillation strength on folded paths can be expressed as a product of the one-way scintillation strength and a function of the distance source-detector in units of the outer scale. The analytical prediction shows that the ratio of the log intensity variances on the folded paths to the one on the one-way path, goes from 2 superscript (17/6), for exact folding (the distance source-detector is zero), to 2 superscript (11/6) when the detector is far away from the source. The theoretical predictions have been corroborated by preliminary field experiments. GRA

N83-16604*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
SHORT WAVELENGTH ELECTROSTATIC WAVES IN THE EARTH'S MAGNETOSHEATH Progress Report
D. L. Gallagher Jul. 1982 70 p refs
(Contracts NAS5-20093; NAS5-26819; Grants NGL-16-001-002; NGL-16-001-043; Contract N00014-76-C-0016)
(NASA-CR-169648; NAS 1.26:169648; AD-A119875; U-OT-IOWA-82-21) Avail: NTIS HC A04/MF A01 CSCL 08/14

Recent observations with the ISEE-1 spacecraft have found electric field emissions in the dayside magnetosheath whose frequency spectrum is modulated at twice the spacecraft spin period. The upper frequency cut-off in the frequency-time spectrum of the emissions has a characteristic parabola shape or festoon shape. The low frequency cutoff ranges from 100 Hz to 400 Hz, while the high frequency limit ranges from about 1 kHz to 4 kHz. The bandwidth is found to minimize for antenna orientations parallel to the wave vectors. The wave vector does not appear to be related to either the local magnetic field direction or the plasma flow velocity. The spacecraft observed frequency spectrum results from the spacecraft antenna response to the Doppler shifted wave vector spectrum which exists in the plasma. Imposed constraints on the plasma restframe wave vectors and frequencies indicate that the emissions occur within the frequency range from about 150 Hz to 1 kHz, with wavelengths between about 30 meters and 600 meters. These constraints strongly suggest that the festoon-shaped emissions are ion-acoustic waves. The small group velocity and k direction of the ion-acoustic mode are consistent with wave generation upstream at the bow shock and convection downstream to locations within the outer dayside magnetosheath.
Author (GRA)

N83-16605# RAND Corp., Santa Monica, Calif.
ELECTROMAGNETIC PROPERTIES AND COMMUNICATION CHARACTERISTICS OF PACSAT
Edward Bedrosian Aug. 1982 101 p refs
(Contract MDA903-78-C-0281)
(AD-A120243; RAND/R-2920-ARPA) Avail: NTIS HC A06/MF A01 CSCL 22/2

This report presents an analysis of various technical and system properties of a passive communication satellite concept known as PACSAT. The satellite is a linear array of scatterers oriented toward the center of the Earth by the gravity-gradient force. The scatterers are assumed to consist of perfectly conducting spheres that are uniformly spaced. First the scattering cross section of the array is developed and the effects of flexure and near-field operation are considered. The array is then assumed to be in a circular equatorial orbit and various system and orbit parameters are calculated for users in a service area approximating the United States in shape. Finally, communication characteristics are investigated and power budgets presented for typical system configurations. GRA

N83-16606# Range Commanders Council, White Sands Missile Range, N. Mex. Optical Systems Group.
GLOSSARY OF TELEVISION TERMS Final Report
Sep. 1982 60 p
(AD-A120303) Avail: NTIS HC A04/MF A01 CSCL 17/2

This glossary was compiled by the members and associate members of the Range Commanders Council (RCC) Optical Systems Group (OSG). The OSG recognizes that the utilization of television for data gathering purposes has increased drastically in the last decade. Because many of the personnel involved in range operations and maintenance have a limited background in television, the OSG membership felt that a glossary containing selected television terminology would contribute to understanding the theoretical, engineering, operational, and maintenance applications of television. Since the term 'television' covers a broad spectrum, many of the words and phrases that apply solely to broadcast and Community Antenna Television (CATV) have not been included here. Also it has been assumed that the user of this publication will not be applying any television technology aside from periodic video tape editing. Furthermore, it is assumed that most of the video tape editing which takes place will be confined to tape-to-tape editing utilizing the built-in features characteristic of video recorders currently available. GRA

N83-16607# Naval Research Lab., Washington, D. C. Communications Systems Engineering Branch.
SECOND REPORT OF THE MULTIRATE PROCESSOR (MRP) FOR DIGITAL VOICE COMMUNICATIONS Final Report
G. S. Kang and L. J. Fransen 30 Sep. 1982 29 p refs
(AD-A120591; NRL-8614) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report documents recent developments of the Navy-developed voice processor that provides compatible low-data-rate and high-data-rate voice communication: 2.4 kilobits per second (kb/s) for narrowband channels; 9.6 and 16 kb/s for wideband channels. The compatibility of the narrowband and wideband channels arises from the unique characteristic of the voice processor that the transmitted bit-stream of the 16-kb/s data contains the bit-stream of the 9.6-kb/s data as a subset. Likewise, the bit-stream of the 9.6-kb/s data also contains the bit-stream of

the 2.4-kb/s data as a subset. This embedded data structure makes it possible to interconnect, without user intervention, narrowband and wideband systems via a digital rate-converter located somewhere along the link. An advantage of this method of rate conversion is that it permits end-to-end encryption of speech data. Also during overloaded or disrupted channel conditions, communication survivability may be increased by rate reduction and/or rerouting through other available narrowband communication links. This report includes results of intelligibility and conversation tests which indicate the embedded 9.6-kb/s rate compares well with continuously variable slope delta modulation (CVSD) at 16 kb/s, and the embedded 16 kb/s performs comparably to CVSD at 32 kb/s. Author (GRA)

N83-16608# Delta Information Systems, Inc., Jenkintown, Pa.
INVESTIGATION OF RESOLUTION FOR GROUP 4 FACSIMILE Final Report
Aug. 1982 121 p
(Contract DCA100-81-C-0042)
(AD-A120614; NCS-TIB-82-5) Avail: NTIS HC A06/MF A01 CSCL 17/2

The objective of this study is to analyze alternative resolution rates for Group 4 facsimile. Four test documents were scanned at five candidate resolutions and the results of all twenty scans were printed. One of the test charts (the Legibility Test Chart) was developed on this project and is designed to measure the legibility of a visual communication system. The legibility of various character fronts at alternative resolutions was mesured. In addition the compression ratio for the Modified Read Code for each of the 20 scans was measured. GRA

N83-16609# Texas Univ., Austin. Dept. of Computer Sciences.
PROVING SAFETY AND LIVENESS OF COMMUNICATING PROCESSES WITH EXAMPLES
J. Misra, K. M. Chandy, and Todd Smith Aug. 1982 10 p refs Proc. of the ACM SIGACT/SIGOPS Conf. on the Principles of Distributed Computing, Ottawa, Ontario, 18-20 Aug. 1982
(Grant AF-AFOSR-0205-81; AF Proj. 2304)
(AD-A120372; AFOSR-82-0883TR) Avail: NTIS HC A02/MF A01 CSCL 17/2

A method is proposed for reasoning about safety and liveness properties of message passing networks. The method is hierarchical and is based upon combining the specifications of component processes to obtain the specification of a network. The inference rules for safety properties use induction on the number of messages transmitted; liveness proofs use techniques similar to termination proofs in sequential programs. The authors illustrate the method with two examples: concatenations of buffers to construct larger buffers and a special case of Stenning protocol for message communication over noisy channels. GRA

N83-16610# Ohio State Univ., Columbus. Electroscience Lab.
THE SINR PERFORMANCE OF CASCADED ADAPTIVE ARRAYS
Henry S. Eilts Griffiss AFB, N.Y. RADC Jul. 1982 37 p refs (Contract F30602-79-C-0068; AF Proj. 4519)
(AD-A120485; ESL-711679-9; RADC-TR-82-134) Avail: NTIS HC A03/MF A01 CSCL 09/5

This report analytically examines and discusses ways of maximizing the output signal-to-noise plus interference ratio (SINR) of cascaded processors. Investigations of various configurations of cascaded Power Inversion (PI) and Least Mean Square (LMS) processors are considered. The primary objective of the investigation is to derive techniques to overcome the limited dynamic range problem of the LMS processor. First a fully implemented cascaded array system of N-elements is considered where each LMS array has N inputs, each of which is preceded by a PI array with each PI array connected to all antenna elements. This makes it possible to investigate the interaction of cascading the two processors, but it is an unrealistic implementation because of cost and complexity. Alternate approaches, referred to an thinned cascaded designs, examines the SINR output of cascaded arrays employing a minimum of PI control loops while maintaining maximum SINR. In general, it was determined that maximum SINR could not be maintained by arbitrarily thinned configurations, but could be achieved for a number of cases by careful selection of the PI steering vectors. GRA

N83-16611# Los Alamos Scientific Lab., N. Mex.
SUPERFISH Status Report
Don W. Reid, Alex Harvey, G. W. Rodenz, and Ronald F. Holsinger (Field Effects, Inc., Carlisle, Mass.) 1981 3 p refs Presented at the Linear Accelerator Conf., Santa Fe, N. mex., 19-21 Oct. 1981
(Contract W-7405-eng-36)
(DE82-004342; LA-UR-81-3054; CONF-811083-11) Avail: NTIS HC A02/MF A01

The computer code SUPERFISH was developed to calculate various parameters associated with RF fields in axially symmetrical cavities of arbitrary shapes. Since the introduction of the code in 1976, it has been in continuous use at Los Alamos National Laboratory. Over the intervening years there have been numerous utility improvements, and several technical additions to the program. These modifications and additions are described, and the basic capabilities of SUPERFISH are reviewed. DOE

N83-16612# Ames Design Collaborative, Iowa.
INVERSE SCATTERING AT LONG WAVELENGTH: DELTA MU = 0
James H. Rose 1981 5 p refs Presented at AF/DARPA Rev. of Progr. in Quant. NDE, Boulder, Colo., 2-7 Aug. 1981
(Contract W-7405-eng-82)
(DE82-004774; IS-M-360; CONF-810839-6) Avail: NTIS HC A02/MF A01

The direct and inverse scattering of elastic waves from localized flaws in elastic media in the long wavelength limit are discussed. For isotropic homogeneous ellipsoidal inclusions in an otherwise isotropic homogeneous medium several interesting results are discussed. First, if the host and flaw have the same shear modulus, delta mu = 0, then the size, shape or orientation of the flaw from a complete set of long wavelength scattering measurments cannot be inferred. The results for long wavelength scattering are based on some results for the elastostatic strain field induced in an ellipsoidal inclusion when delta mu is zero or small. DOE

N83-16613# Los Alamos Scientific Lab., N. Mex.
RFQ POLE-TIP CONSTRUCTION
K. R. Crandall and J. E. Stovall 1981 4 p refs Presented at the Linear Accelerator Conf., Santa Fe, N. Mex., 19-21 Oct. 1981
(Contract W-7405-eng-36)
(DE82-006160; LA-UR-81-3695; CONF-811083-27) Avail: NTIS HC A02/MF A01

The success of the radio frequency quadrupole (RFQ) proof of principle (POP) tests conducted in 1980 at Los Alamos have essentially guaranteed that the RFQ linac will be used in many accelerator projects soon. Several RFQs are already under construction at Los Alamos, and we expect to be designing and machining the vanes for several RFQs to be built at other installations. The technique for machining the vanes for the POP RFQ was developed by Williams and Potter. While retaining their basic approach, we have modified their technique for generating the data required by the milling machine from the parameters defining the vane shapes. The objective of this exercise has been to develop a generalized fabrication procedure that could be used in commercial machine shops. DOE

N83-16614# California Univ., Livermore. Lawrence Livermore Lab.
SOME RESULTS FROM A STATISTICAL SCATTERING EXPERIMENT
E. K. Miller and J. T. Okada Sep. 1982 7 p ref Presented at the IEEE Intern. Symp. on Electromagnetic Compatibility, Santa Clara, Calif., 8-10 Sep. 1982
(Contract W-7405-eng-48)
(DE82-012383; UCRL-87235; CONF-820910-1) Avail: NTIS HC A02/MF A01

The complex environments in which many electromagnetic

systems must operate (consider the antenna arrangements found on typical navy ships) make their analysis in any rigorous sense largely impractical. Yet it is important that the perturbing effect of such environments be somehow accounted for in evaluating system performance. Some results from a statistical experiment conducted in the time domain to measure the effects caused by N nearby identical scatters on the receiving properties of a given antenna are presented. It is found that the variance of the peak antenna current at first increases, and then decreases as N increases, with the environment changing from a discrete to an essentially continium or medium-like behavior. This mean peak current, on the other hand, decreases monotonically with increasing N. DOE

N83-16615# Engins Matra, Velizy (France). Developpement Moyens Didactiques.
SPEECH RECOGNITION AND SYNTHESIS [RECONNAISSANCE ET SYNTHESE DE LA PAROLE]
Lionel deMauduitduPlessix 1982 138 p refs In FRENCH; ENGLISH summary
(VAU/82/101) Avail: NTIS HC A07/MF A01

The state of the art of speech recognition by computers is reviewed. The human vocal and auditory mechanisms are described, and digitizing of voice signals is introduced. Techniques used in vocoders to achieve a bit rate < 5 k bits/sec are summarized. Channel, linear prediction, and farmant vocoders are discussed, as are standardization and integration of vocoders.
Author (ESA)

N83-16616# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Festkoerperforschung.
LIGHT SCATTERING ON SPIN WAVES OF THIN FERROMAGNETIC FILMS AND HETEROGENEOUS DOUBLE LAYERS Thesis - Cologne Univ. [LICHTSTREUUNG AN SPINWELLEN DUENNER FERROMAGNETISCHER SCHICHTENUND HETEROGENER DOPPELSCHICHTEN]
C. M. Mayr Jul. 1982 109 p refs
(JUEL-1792; ISSN-0366-0885) Avail: NTIS HC A06/MF A01

Iron, nickel and permalloy films were evaporated onto saphire and silicon substrates, and saturation magnetization, exchange constant and the gyromagnetic ratio were determined from measurements of the dispersion of the spin wave energies as a function of film thickness, which varied between 5 and 100 nm. Coupling of the surface modes of two ferromagnetic layers, separated by a nonmagnetic spacer was examined. Asymmetry in the ratio of the intensities of Stokes and anti-Stokes scattering down to film thicknesses of some nanometers and an increase of the scattering intensity upon decreasing film thickness were studied. The latter appears for suitable combinations of film and substrate materials. The maximum of the intensity versus thickness curve peaks at 5 nm.
Author (ESA)

N83-16617# Fernmeldetechnisches Zentralamt, Darmstadt (West Germany).
CONSIDERATIONS ON A 70 MBIT/S LINE SYSTEM AND ITS INSERTION INTO THE DIGITAL NETWORK
Hans-Werner Wellhausen, Willy Bartel, and Horst Friedrich Roeder May 1982 26 p refs
(FTZ-442-TBr-15) Avail: NTIS HC A03/MF A01

A 70 Mbit/sec transmission line system for coaxial cables which allows the transmission of the same number of telephone channels, with the same field lengths, as the corresponding carrier frequency system V 960 is proposed. The high attenuation values, which are due to the field lengths given, are handled by a redundance-free, quaternary signal transmission. For error monitoring the frame alignment signal of the digital signal multiplex equipment DSMX 34/70 was used. For the DSMX 70/140 a frame structure which conforms to CCITT specifications, with input bit rate between 69.100 and 69.120 Mbit/sec is proposed. Final specification of bit rate and frame structure cannot be made before a bit rate for the coded television signal is standardized. The introduction of the proposed multiplex and line systems considerably increases flexibility in network design with improved utilization of the existing coaxial cables. A broadband, coded television signal could be transmitted as a single channel in the digital network.
Author (ESA)

N83-16618# Fernmeldetechnisches Zentralamt, Darmstadt (West Germany).
AUTOMATIC DETERMINATION OF NONLINEAR DISTORTIONS IN TELEVISION TRANSMISSION WITH ENERGY DISPERSAL SIGNALS [AUTOMATISCHE BESTIMMUNG DER NICHTLINEAREN VERZERRUNGEN BEI FERNSEHUEBERTRAGUNG MIT VERWISCHUNGSSIGNALEN]
Johann K. Nikl Apr. 1982 21 p refs In GERMAN
(FTZ-447-TBr-15) Avail: NTIS HC A02/MF A01

An energy dispersal signal to be added to FM television signal in order to reduce stationary interference components in neighboring channels is proposed. The signal is composed of a triangular voltage, the polarity of which is reversed in a given period, providing reproducible measurements corresponding to the image quality, even with test line measuring signals. In these conditions it is possible to use automatic distortion systems, adjusting to optimum image quality.
Author (ESA)

N83-16619# Deutsche Bundespost, Raisting (West Germany). Fermmeldetechnisches Zentralamt.
APPLICATIONS OF PERIODIC INTEGRATED OPTICAL STRUCTURES IN COMMUNICATION CIRCUITS
R. Zengerle Jan. 1980 65 p refs Transl. into ENGLISH of the book "Einsatzmoglichkeiten Periodischer Integriert Optischer Strukturen in Nachrichtentechnischen Schaltungen" Jan. 1980
(PB82-262155; Rept-465-TBR-20) Avail: NTIS HC A04/MF A01 CSCL 17B

The application of periodic structures as integrated optical or micro-optical circuits in signal transmission and signal processing is reviewed critically. Difficulties of implementation are also indicated. Narrow-band optical emitters, modulators and switches, multiplex structures, and filters are discussed. Multiplex structures used for better utilization of transmission capacity of fibers and filters are discussed. Multiplex structures used for better utilization of transmission capacity of fibers and filters are found especially attractive. The coupling between fibers and integrated optical structures by means of transversal, horizontal or grid coupling is treated. In view of the complexity of the technology an economical application is thought to be possible only if mass production can be achieved.
Author (GRA)

N83-16620# Institute for Telecommunication Sciences, Boulder, Colo.
FADING SIGNALS IN THE MF BAND
A. E. Spaulding Jun. 1982 43 p refs
(PB82-262916; NTIA-82-102) Avail: NTIS HC A03/MF A01 CSCL 17B

Techniques needed to properly determine the degree of interference from one or more distant broadcasting stations are discussed. Computer algorithms are developed which determine the actual overall fading distribution of one or a combination of two fading signals, when the short-term fading of each is represented by a Rayleigh distribution and the long-term fading of median values is given by a log-normal distribution. Also, a simple approximate means of determining the distribution of the median value of a signal given by the sum of any number of fading signals is given. This approximate method is accurate only for the smaller percentage points. It is found that the techniques described here lead to somewhat higher values for the sum of the signals than previous methods.
GRA

N83-16621# Federal Communications Commission, Washington, D. C. Office of Science and Technology.
A COMPUTER PROGRAM FOR CALCULATING EFFECTIVE INTERFERENCE TO TV SERVICE (COMPUTER PROGRAM TVINT)
Harry K. Wong Jul. 1982 85 p refs
(PB82-250911; FCC/OST-TM-82-2) Avail: NTIS HC A05/MF A01 CSCL 17B

A computer program was developed for the calculation of

interference to TV service. The concept of 'effective interference' which is defined as the joint probability of service and interference is introduced and integrated over the area of interest. The program also performs standard interference calculations, wherein interference contours are based on 50% probability of interference. The program can be used in an interactive mode with user options to calculate the location of any desired service or interference contour, the size of any service or interference area and the net 'effective interference' within any service area. The user also has options to include the effects of receiver filters, receiving antennas cross polarization and front-to-back ratios and terrain roughness. The report includes values for desired to undesired ratios and other input parameters for calculating adjacent channel and cochannel TV to TV interference for all bands, and FM interference to TV channel 6 service. GRA

N83-16622# Federal Communications Commission, Washington, D. C. Office of Science and Technology.
FIELD TESTS OF 216 TO 220 MHz TRANSMITTERS FOR COMPATIBILITY WITH TELEVISION CHANNELS 13 AND 10
H. Davis Jun. 1982 25 p
(PB82-250929; FCC/OST/TM-82-4) Avail: NTIS HC A02/MF A01 CSCL 17B

Limited field tests of potential interference to television Channels 13 and 10 were conducted in response to a memorandum entitled, "Inland Waterways Communications Service". These tests indicated that it would be inadvisable to permit arbitrary placement of 50 watt transmitters at frequencies from 216-220 MHz in service areas of Channels 13 and 10. However, the data shows the promise of allocating 216 to 220 MHz to an Inland Waterways Communications Service on a basis of non-interference to other services. The tests also tend to confirm predictions based on propagation data and laboratory measurements of television receiver performance. Four television receivers were observed at various locations in the service area of two television stations at Baltimore, Maryland: Channel 13 and Channel 11, the latter being used to simulate the half-IF beat phenomenon to Channel 10. GRA

N83-16623# Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e. V., Freiburg (West Germany). Inst. fuer Angewandte Festkoerperphysik.
SEMICONDUCTOR TECHNOLOGY FOR VLSI: PLASMA ETCHING AND HIGH-PRESSURE OXIDATION
Konrad Eisele Jul. 1982 73 p refs Transl. into ENGLISH of the mono. "Halbleitertechnologien fuer Grossintegration: Gasatztechnik und Hochdruckoxidationen" West Germany, Aug. 1981 p 1-100 Original language document available as N82-15304 Sponsored in part by Bundesministerium fuer Forschung und Technologie
(PB82-249707; BMFT-FB-T-81-115) Avail: NTIS HC A04/MF A01 CSCL 09E

The large scale integration of electronic circuits on silicon requires etching of structures in the range of 1 micrometer or smaller. This cannot be achieved by wet chemical means. Dry etching processes, however, do produce an exact replica of the desired structure in those materials which are common in silicon planar technology. These procedures depend on the RF energy, on how this is coupled to the substrate to be etched, and on the pressure. They are, accordingly, called plasma etching or reactive ion etching. Their etch rate and selectivity of the relevant materials for various gases was examined. MOS properties can be restored to their original level by annealing. The design of a practical etch reactor is outlined. GRA

N83-17387*# Berry Coll., Mount Berry, Ga. Dept. of Physics.
SUTDY OF AND PROPOSALS FOR THE CORRECTION OF ERRORS IN A RADAR RANGING DEVICE DESIGNED TO FACILITATE DOCKING OF A TELEOPERATOR MANEUVERING SYSTEM
Malcolm W. McDonald *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 17 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 17I

N83-17392*# Tennessee Univ. Space Inst., Tullahoma. Dept. of Electrical Engineering.
THE APPLICATION OF DIGITAL SIGNAL PROCESSING TECHNIQUES TO A TELEOPERATOR RADAR SYSTEM
Alfonso Pujol *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 17I

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N83-16624# Electricity Council, London (England).
HEATING OF THIN PRODUCTS BY MEANS OF TRANSVERSE-FLUX INDUCTORS
Feb. 1980 31 p Transl. into ENGLISH of rept. Centre des Renardieres, France, 12 Nov. 1979
(BLL-OA-Trans-1967-(6196.3); HE-122W-1519) Avail: British Library Lending Div., Boston Spa, Engl.

There are some forms of metallic products which do not lend themselves well to induction heating upon first consideration, either because of their shape (small thickness) or their nature (materials with low resistance). In particular, this applies to all products in the form of a thin sheet. Various applications are suggested such as the drying of the sheet after pickling the heating of the sheet in order to dry or harden varnish lacquer, and the heat treatment of aluminium sheet. S.L.

N83-16625 Materials Research Labs., Melbourne (Australia). Physical Chemistry Div.
ELECTRICAL RESISTANCE TESTING OF ANTISTATIC BENCH AND FLOOR SURFACE MATERIAL AFTER LAYING
Michael G. Wolfson and Kenneth J. Lee Aug. 1982 53 p refs (MRL-TN-466; AR-003-047) Avail: Issuing activity

Large areas of floors and benchtops in laboratories are covered with an antistatic material. Electrical resistance testing of this material after laying is reported. S.L.

N83-16626* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PULSED PHASE LOCKED LOOP STRAIN MONITOR Patent
Joseph S. Heyman, inventor (to NASA) Issued 23 Oct. 1980 7 p Filed 23 Oct. 1980 Supersedes N81-15195 (19 - 06, p 0740)
(NASA-Case-LAR-12772-1; US-Patent-4,363,242;
US-Patent-Appl-SN-199767; US-Patent-Class-73-761;
US-Patent-Class-73-579; US-Patent-Class-73-597;
US-Patent-Class-73-629) Avail: US Patent and Trademark Office CSCL 09A

The RF output of a voltage controlled oscillator (VCO) is periodically gated to a transducer which produces acoustic waves in a bolt. The reflected acoustic waves are converted to electrical signals by the transducer and gated to a mixer which also receives the output from the VCO and produces an output which is filtered by a low pass filter. The output of filter is a dc signal proportional to the phase difference change from a fixed phase difference between the two input signals to the mixer. This dc signal is sampled at an instant and held by circuit in response to the 'P' signal. The output of the circuit is integrated and then applied to the VCO to change the frequency of the VCO such that the phase difference between the two inputs to the mixer remains at the fixed phase difference. The frequency of the VCO is a measure of the change in strain of the bolt.

Official Gazette of the U.S. Patent and Trademark Office

N83-16627*# National Aeronautics and Space Administration, Washington, D. C.
TWO-DIMENSIONAL EFFECTS AND A COMPARISON OF THEORY AND EXPERIMENT
V. N. Shevchik Sep. 1982 27 p refs Transl. into ENGLISH of lecture paper from the Third Winter School, Saratov, USSR, 1975 p 215-239 Presented at the Seminar of Engr., Saratov, USSR, 1974 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76960; NAS 1.15:76960) Avail: NTIS HC A03/MF A01 CSCL 09C

Annular beam models are used to investigate two dimensional processes in axial-symmetrical instruments. One of the versions of an annular model suitable for the design of a grouper and an output resonator is described. Author

N83-16628*# General Electric Co., Schenectady, N. Y. Power Electronics Lab.
ADVANCED AC PERMANENT MAGNET AXIAL FLUX DISC MOTOR FOR ELECTRIC PASSENGER VEHICLE Final Report
Gerald B. Kliman Oct. 1982 227 p refs
(Contracts DEN3-76; DE-AI01-77CS-51044)
(NASA-CR-167975; DOE/NASA/0076-82/1; NAS 1.26:167975; SRD-81-097) Avail: NTIS HC A11/MF A01 CSCL 09C

An ac permanent magnet axial flux disc motor was developed to operate with a thyristor load commutated inverter as part of an electric vehicle drive system. The motor was required to deliver 29.8 kW (40 hp) peak and 10.4 kW (14 hp) average with a maximum speed of 11,000 rpm. It was also required to run at leading power factor to commutate the inverter. Three motors were built. Author

N83-16629*# National Aeronautics and Space Administration, Washington, D. C.
METHOD OF PRODUCING NICKEL ELECTRODE
Yutaka Ikeda, Tsukasa Ohira, Yasuyuki Kumano, and Toshio Nakao Aug. 1982 7 p Transl. into ENGLISH from Japanese Patent no. 55-32193 (Appl. no. JA-047066, 17 Apr. 1975) p 175-177 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76944; NAS 1.15:76944) Avail: NTIS HC A02/MF A01 CSCL 09C

A large capacity nickel electrode in which the charging efficiency and discharge capacity are improved (in comparison with nickel electrodes produced by the conventional method) is obtained by immersing nickel electrodes retaining active nickel material (oxide or hydroxide) or nickel active material and cobalt compounds whose pH is adjusted in the range of 3.5 to 6.0. The hydroxide or oxide is crystallized by pyrolysis or immersion in alkali, thereby coating the surface of the nickel active material with cobalt crystals and simultaneously promoting alloying of nickel cobalt. A.R.H.

N83-16630*# General Electric Co., Philadelphia, Pa. Space Div.
DESIGN STUDY OF A HIGH POWER ROTARY TRANSFORMER
S. M. Weinberger Jul. 1982 59 p refs
(Contract NAS3-23155)
(NASA-CR-168012; NAS 1.26:168012; GE-82SDS4222) Avail: NTIS HC A04/MF A01 CSCL 09C

A design study was made on a rotary transformer for transferring electrical power across a rotating spacecraft interface. The analysis was performed for a 100 KW, 20 KHz unit having a "pancake" geometry. The rotary transformer had a radial (vertical) gap and consisted of 4-25 KW modules. It was assumed that the power conditioning comprised of a Schwarz resonant circuit with a 20 KHz switching frequency. The rotary transformer, mechanical and structural design, heat rejection system and drive mechanism which provide a complete power transfer device were examined. The rotary transformer losses, efficiency, weight and size were compared with an axial (axial symmetric) gap transformer having the same performance requirements and input characteristics which was designed as part of a previous program. The "pancake" geometry results in a heavier rotary transformer primarily because of inefficient use of the core material. It is shown that the radial gap rotary transformer is a feasible approach for the transfer of electrical power across a rotating interface and can be implemented using presently available technology. Author

N83-16631 Royal Aircraft Establishment, Farnborough (England).
STRUCTURE FORMATION IN ELECTRO-RHEOLOGICAL SUSPENSIONS IN AN ELECTRICAL FIELD. 1: QUALITATIVE CONSIDERATIONS
Z. P. Shulman, A. D. Matsepuro, and B. M. Khusid Jun. 1982 10 p refs Transl. into ENGLISH from Vestsi Akad. Navuk Belaruskai SSR (USSR), no. 3, 1977 p 116-121
(RAE-Trans-2088; BR86200) Copyright. Avail: Issuing Activity

Based on the formerly conducted studies of electro-rheological suspensions and model particles, the reasons for an electro-rheological effect are discussed. An attempt has been made to follow the connection between the formation of strong bridge structures of particles in an electric field determining the character of the mechanical behavior of suspensions and the peculiarities of charge transport in an adsorption activator on the surface of silica gel particles. Author

N83-16632# Royal Aircraft Establishment, Farnborough (England).
STRUCTURE FORMATION OF ELECTRO-RHEOLOGICAL SUSPENSIONS IN AN ELECTRIC FIELD. 2: QUANTITATIVE EVALUATIONS
Z. P. Shulman, B. M. Khusid, and A. D. Matsepuro Jun. 1982 10 p refs Transl. into ENGLISH from Vestsi Akad. Navuk Belaruskai SSR (USSR), no. 3, 1977 p 122-127
(RAE-Trans-2089; BR86201) Copyright. Avail: Issuing Activity

On the basis of the model of an interelectrode bridge which stretches with motion of one of the electrodes, the calculation of an increment of the shear stress in the Couette flow for an electro-rheological suspension with an applied electrical field normal to the shear planes has been carried out. The calculated results are compared with experimental data. Author

N83-16633*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AMPOULE SEALING APPARATUS AND PROCESS Patent Application
William J. Debnam, Jr. and Ivan O. Clark, inventors (to NASA) Filed 30 Jun. 1982 10 p
(NASA-Case-LAR-12847-1; US-Patent-Appl-SN-393456) Avail: NTIS HC A02/MF A01 CSCL 09C

An apparatus and process for sealing fused quartz ampoules housing a semiconductor growth charge under vacuum is described. An elongated fused quartz ampoule having an enlarged diameter open end and a reduced diameter closed end is vertically retained in a vacuum assembly. A semiconductor charge is disposed within the reduced diameter portion of the ampoule. A quartz plug of substantially the same diameter as the reduced diameter portion is suspended within the open and of the ampoule via a rotary vacuum feed. After evacuation of the ampoule a plug is lowered into the reduced diameter area and sealed therein while maintaining the vacuum on the ampoule. The charged ampoule area is then separated from the remaining structure by breaking along the scored line. NASA

N83-16634# Thomas Electronics Inc., Wayne N. J.
MANUFACTURING METHODS AND TECHNOLOGY (MM AND T) SPECIFICATIONS FOR MINIATURE CATHODE RAY TUBE Quarterly Report, 1 Apr. - 30 Jun. 1982
F. M. Bruno 31 Jul. 1982 15 p
(Contract DAAK70-80-C-0168)
(AD-A120793; TEI-A009-7; QR-7) Avail: NTIS HC A02/MF A01 CSCL 13/8

Earlier problems with deflection coil design concerning barreling sensitivity and horizontal linearity were resolved. Life-testing of the P-43 phosphor screen continued. In house test fixtures were designed and fabricated, and are now under Engineering review. TEI's procedures were refined for manufacturing tests and for

environmental and reliability testing. CRT assemblies for the 3rd Submission of Phase I Engineering Samples were completed and ready for source testing. TEI began to manufacture and test CRT assemblies for Phase II - Confirmatory Samples. Author (GRA)

N83-16635# Rockwell International Corp., Thousand Oaks, Calif. Microelectronics Research and Development Center.
SEMI-INSULATING BUFFER LAYER TECHNOLOGY Annual Report, 1 Mar. 1981 - 30 Apr. 1982
R. D. Fairman and J. R. Oliver Jul. 1982 65 p refs
(Contract F49620-81-C-0038; AF Proj. 2306)
(AD-A120203; AFOSR-82-0861TR; MRDC41086.2ARF) Avail: NTIS HC A04/MF A01 CSCL 09/1

Semi-insulating buffer layer technology describes a study of undoped and intentionally doped epitaxial buffer layers grown on lightly chromium doped horizontal Bridgman and undoped LEC substrates. Specific effects of substrate impurity redistribution from bulk substrates are described by improved characterization techniques such as SIMS depth profiling, 4K Photoluminescence, Photo Induced Transient Spectroscopy (PITS) and Spark Source Mass Spectrometry (SSMS). Important correlation of dominant impurity centers has been established by Dark Conductivity Measurements. An important discovery of Fe redistribution in epitaxial layers during vapor phase growth was made by detailed chemical optical and electrical transport measurements on undoped epitaxial layers. An assessment of the effects of Oxygen doping in VPE GaAs was made using 18O(2) which resulted in the identification of an oxygen 2- related deep donor at Ec-0.67 eV. P-type conductivity resulting from oxygen 2 doping was shown to be due to a dominant Fe(2+) center. Effects of carrier removal by oxygen 2 doping were also shown. GRA

N83-16636# Naval Research Lab., Washington, D. C.
COMMENTS ON FERRITE PHASE SHIFTER CONFIGURATIONS FOR THE MILLIMETER WAVE REGION
M. L. Reuss, Jr. 28 Sep. 1982 14 p refs
(AD-A119913; NRL-MR-4921) Avail: NTIS HC A02/MF A01 CSCL 09/1

In the microwave region of the electromagnetic spectrum, electronically controllable ferrite phase shifters have demonstrated their value as components and as control elements for switches and attenuators. As the need for control components operating in the lower millimeter wave region increases, it is a reasonable approach to scale successful microwave ferrite configurations into the lower millimeter wave region (30 GHz to 140 GHz). However, many problems are encountered when attempting to scale efficient microwave ferrite configurations, particularly latching ferrite configurations, into the millimeter wave region. It is the objective of this report to review several ferrite configurations with the intent that consideration of these configurations may stimulate development of practical millimeter wave configurations. Ferrite phase shifter configurations that will be the subject of comment include the toroidal (dual slab), dual mode, Bush-Reggia-Spencer, and single slab configurations. Comments are also presented on a circulator used as a phase shifter. Author (GRA)

N83-16637# Army Aeromedical Research Unit, Fort Rucker, Ala. Sensory Research Div.
CATHODE-RAY-TUBE RASTER LINE SELECTOR WITH HORIZONTAL MODULATION CAPABILITY Final Report
John H. Hapgood and Clarence E. Rash Sep. 1982 15 p
(DA Proj. 4E4-64207-D-425)
(AD-A120596; USAARL-82-10) Avail: NTIS HC A02/MF A01 CSCL 09/1

A simple and inexpensive circuit which provides a method of selecting the number and position of active raster lines visible on a CRT display is presented. Requiring inputs of vertical drive and horizontal and vertical sync signals, the circuits produces an output which can be fed directly into the video input of the display. GRA

N83-16638# Washington Univ., St. Louis, Mo. Dept. of Electrical Engineering.
VPE GROWTH OF InP FOR ELECTRONIC DEVICES
J. M. Bornholdt, R. E. Goldwasser, and F. J. Rosenbaum May 1982 117 p refs
(Contract N00014-79-C-0840; RR0210203)
(AD-A120551; Rept-82-2-ONR) Avail: NTIS HC A06/MF A01 CSCL 09/5

A double dilution reactor for InP growth is described and problems concerning the fabrication of Schottky diodes and MIS contacts on InP are addressed. Device grade material has been obtained from this system. GRA

N83-16639# Boeing Aerospace Co., Houston, Tex.
NETWORK TREE TECHNOLOGY: AS APPLIED TO DEVELOPMENT OF FAULT ISOLATION PROCEDURES Final Report
David E. Peterson Brooks AFB, Tex. AFHRL Sep. 1982 37 p
(Contract F33615-81-C-0010)
(AD-A120560; AFHRL-TP-82-29) Avail: NTIS HC A03/MF A01 CSCL 09/5

This paper describes the activities and conclusions of the Air Force study contract designed to investigate the application of network tree technology to the development of Fault Isolation Procedures. Network tree technology, which was initiated as a formal electrical analysis technique known as Sneak Circuit Analysis, requires that the exact electrical configuration of a system be resident in a computerized data base. This study was to determine how this data base can be used to aid the fault isolation process. Through the analysis of a specific test case, the details of a formal Fault Isolation Procedure development methodology were developed along with the definition of key areas in which automation could be used to make this methodology more cost effective. The results of this study show that the task of developing Fault Isolation Procedure is greatly aided by the use of a computerized data base that depicts te exact electrical continuity of the target system. This data base is selectively sorted to produce plots of system continuity at various levels of detail, and each plot is then used as a tool to create the fault isolation logic. GRA

N83-16640# Lincoln Lab., Mass. Inst. of Tech., Lexington.
RESTRUCTURABLE VLSI PROGRAM Semiannual Technical Summary Report, 1 Oct. 1981 - 31 Mar. 1982
Peter E. Blankenship 29 Oct. 1982 67 p
(Contract F19628-80-C-0002; ARPA Order 3797; AF Proj. 2D30)
(AD-A120471; ESD-TR-82-059) Avail: NTIS HC A04/MF A01 CSCL 09/5

This report describes work on the Reconstructable VLSI Research Program sponsored by the Information Processing Techniques Office of the Defense Advanced Research Projects Agency during the semiannual period 1 October 1981 through 31 March 1982. GRA

N83-16641# Los Alamos Scientific Lab., N. Mex.
INTERNAL RESISTIVE INITIATION COIL ELECTROMAGNETICS IN THE FED/INTOR BASELINE DESIGN
H. F. Vogel, George Bronner (Princeton Univ.), and John G. Murray (Princeton Univ.) 1981 6 p refs Presented at 9th Symp. on Engr. Problems of Fusion Res., Chicago, 26-29 Oct. 1981
(Contract W-7405-eng-36)
(DE82-002363; LA-UR-81-2986; CONF-811040-66) Avail: NTIS HC A02/MF A01

Some of the electric requirements were determined for radio frequency nonassisted plasma initiation from normal conducting coils inside Tokamak toroidal field coils in the presence of cryostats and other major structures. The effects of bellows or highly insulated sections were also studied. Depending on whether or not insulating sections are used, the field penetration time is 50 to 90 ms, the blip pulse length is 0.15 to 0.19 s, and the power supplied to the blip coils is 400 to 700 MW. Because of its plasma stabilizing effect, a highly conducting vacuum shell is recommended. DOE

N83-16642# Los Alamos Scientific Lab., N. Mex.
COMPARATIVE PERFORMANCE EVALUATION OF TWO SUPERCOMPUTERS: CDC CYBER-205 AND CRI CRAY-1

Ingrid Y. Bucher and James W. Moore 1981 33 p refs Presented at 12th CMG Intern. Conf. on Computer Performance Evaluation Existing Computer Appl., New Orleans, 1-4 Dec. 1981
(Contract W-7405-eng-36)
(DE81-025376; LA-UR-81-1977; CONF-8111202-2) Avail: NTIS HC A03/MF A01

This report compares the performance of Control Data Corporation's newest supercomputer, the Cyber-205, with the Cray Research, Inc. Cray-1, currently the Laboratory's largest main-frame. The rationale of our benchmarking effort is discussed. Results are presented of tests to determine the speed of basic arithmetic operations, of runs using our standard benchmark programs, and of runs using three codes that have been optimized for both machines; a linear system solver, a model hydrodynamics code, and parts of a plasma simulation code. It is concluded that the speed of the Cyber-205 for memory-to-memory operations on vectors stored in consecutive locations is considerably faster than that of the Cray-1. However, the overall performance of the machine is not quite equal to that of the Cray for tasks of interest to the Laboratory as represented by our benchmark set. DOE

N83-16643# General Electric Co., Schenectady, N. Y. Electric Utility Systems Engineering Dept.
UNIFIED ACTIVE AND REACTIVE POWER MODULATION OF HVDC TRANSMISSION SYSTEMS Final Report
C. E. Grund and R. V. Pohl Nov. 1981 249 p refs Sponsored by EPRI
(EPRI Proj. 1426-1)
(DE82-901276; EPRI-EL-2101) Avail: NTIS HC A11/MF A01

The power modulation of a high voltage direct current (HVDC) system for stabilization of an ac/dc network was investigated. It was found that simultaneous modulation of both dc current and voltage was more effective than just current modulation by itself, since the dc voltage modulation could be used to minimize the reactive power changes resulting from a change of the dc current. This helps stabilize the ac busbar voltages at the converters, which reduces undesirable load flow changes to voltage dependent ac loads, thus improving the effectiveness of the dc power modulation. This unified modulation control concept was evaluated by means of digital computer studies as well as a special purpose HVDC simulator. Several combined ac/dc power transmission systems were synthesized for testing of different modulation controller concepts. An optimum controller design incorporating a linear quadratic control algorithm with full state feedback was first studied. This provided a basis for comparison of suboptimal controller designs utilizing reduced state feedback and a Kalman filter state reconstruction technique. DOE

N83-16644# California Univ., Livermore. Lawrence Livermore Lab.
TECHNICAL EVALUATION OF THE PROPOSED DESIGN MODIFICATIONS AND TECHNICAL SPECIFICATION CHANGES ON GRID VOLTAGE DEGRADATION (PART A) FOR THE PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3: SELECTED ISSUES PROGRAM (DOCKET NOS. 50-277, 50-278)
Robert L. White 3 Nov. 1981 14 p refs
(Contract W-7405-eng-48)
(DE82-005460; UCID-19115) Avail: NTIS HC A02/MF A01

The technical evaluation of the proposed design modification and technical specification changes for protection of Class 1E equipment from grid voltage degradation are documented. The review criteria are based on several IEEE standards and The Code of Federal Regulations. The evaluation compares the submittals made by the plant with the NRC staff positions and the review criteria. The licensee meets the requirements of the NRC except for the submittal of proposed technical specification changes to substantiate the proposed circuit modifications and relay set-points. DOE

N83-16645# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.
NEUTRAL-BEAM PLASMA SOURCE METAL-ARC PROTECTION CIRCUIT
G. J. deVries, D. B. Hopkins, A. F. Lietzke, and H. M. Owren Oct. 1981 5 p refs Presented at the 9th Symp. on Eng. Probl. of Fusion Res., Chicago, 26-29 Oct. 1981
(Contract W-7405-eng-48)
(DE82-004028; LBL-12721; CONF-811040-124) Avail: NTIS HC A02/MF A01

Neutral beam sources occasionally suffer from metal arcs inside the plasma chamber. This arcing can cause serious damage when it is sustained. Experience has shown that arcing for less than 10 msec is tolerable. An electronic circuit designed to detect such an arc (or cathode spot) and generate a signal which can be used to turn off the source arc current and the accel voltage is described. One principle of spot recognition is based on the detection of abnormal, fast fluctuations in a Langmuir probe signal. A second detection principle looks for an abnormally low plasma source efficiency by comparing the probe's saturated ion current to the arc current. Both of these principles are exploited in the circuit described. DOE

N83-16646# California Univ., Berkeley. Lawrence Berkeley Lab.
TRANSISTOR RESET PREAMPLIFIER FOR HIGH-RATE HIGH-RESOLUTION SPECTROSCOPY
D. A. Landis, C. P. Cork, N. W. Madden, and F. S. Goulding Oct. 1981 7 p refs Presented at the IEEE Nucl. Sci. Symp., San Francisco, 21-23 Oct. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE82-004549; LBL-13214; CONF-811012-37) Avail: NTIS HC A02/MF A01

Pulsed transistor reset of high resolution charge sensitive preamplifers used in cool semiconductor spectrometers can sometimes have an advantage over pulsed light reset systems. Several versions of transistor reset spectrometers using both silicon and germanium detectors were built. The advantages of the transistor reset system are discussed, several configurations of the packages used for the FET and reset transistor are illustrated. The preamplifier circuit is described and the performance of the spectrometer at high rates is shown. DOE

N83-16647# Oak Ridge National Lab., Tenn. Atomic, Molecular and High Voltage Physics Group.
TERNARY GAS MIXTURES FOR HIGH-VOLTAGE INDUSTRIAL INSULATION
M. O. Pace, C. C. Chan, and L. G. Christophorou 1981 8 p refs Presented at the Elec./Electron. Insulation Conf., Chicago, 19 Oct. 1981
(Contract W-7405-eng-26)
(DE82-002779; CONF-8110129-1) Avail: NTIS HC A02/MF A01

Gas dielectrics for insulating power apparatus, e.g., gas insulated transmission lines (GITL), were evaluated. Particular attention was given to mixtures using large proportions of an electron moderating gas (viz., N2, CHF3, or 1,1,1-C2H3F3) and smaller quantities of two electron attaching gases: SF6 and one fluorocarbon (e.g., c-C4F8). The porportions were sought at which the three gases function best as a team, moderating free electrons from higher to lower energies and there attaching them. Small amounts of the electron attaching additives can drastically raise the dielectric strength of the moderator. Certain combinations of SF6 and fluorocarbons do not produce the undesirable spark by products associated with either SF6 or fluorocarbons alone and also show improved negative polarity impulse breakdown characteristics over pure SF6. Small scale breakdown measurements were made of various ternary mixtures in the GITL geometry. It was found that nitrogen moderates electrons to extremely low energies, where SF6 attaches; the dipolar gases moderate to somewhat higher energies, where some fluorocarbons attach best. DOE

N83-16648# California Univ., Berkeley. Lawrence Berkeley Lab.
LOW-NOISE PREAMPLIFIERS/AMPLIFIERS FOR THE TIME PROJECTION CHAMBER
D. A. Landis, R. S. Adachi, N. W. Madden, and F. S. Goulding Oct. 1981 6 p refs Presented at the IEEE Symp. on Nucl. Sci., San Francisco, 21-23 Oct. 1981 Submitted for publication
(Contract W-7405-eng-48)

(DE82-003716; LBL-13213; CONF-811012-30) Avail: NTIS HC A02/MF A01

The special problems associated with the Time Projection Chamber resulted in the development of a new preamplifier/amplifier system which is discussed. The need for 16,000 channels of low noise electronics imposed serious contraints on the cost, size, and power consumption of the circuits. Also the preamplifiers are designed to work inside the detector chamber. This chamber operates at 10 atmosphere pressure and is sensitive both to the presence of magnetic mateials that distort the drift field, and to the effects of gas contamination. These problems resulted in the use of new components and fabrication techniques. The large number of units involved requires automatic testing as discussed in the paper. DOE

N83-16649# California Univ., Livermore. Lawrence Livermore Lab.

PHYSICAL MODELING OF AVALANCHE-TRANSISTOR SWITCHING

Jackson C. Koo and Michael D. Pocha 12 Aug. 1982 9 p refs (Contract W-7405-eng-48)

(DE83-000339; UCRL-53303) Avail: NTIS HC A02/MF A01

The phenomenon of avalanche second breakdown in epitaxial planar transistors was studied. It is shown that there are two distinct modes of avalanche second breakdown operation: (1) due to temperature rise the thermal mode; and (2) due to excess injection of current under high voltage bias, the current mode. For a fast switching avalanche transistor, the current mode second breakdown is dominant. A two dimensional analysis is used to model the final destruction of the device. When the duration of the second breakdown in an avalanche transistor is limited however such a device is used as a rather fast and repeatable electrical switch, such as in a pulse generation circuit. To design an avalanche transistor for particular applications or to choose an avalanche transistor for a specific circuit, the fundamental relations between the basic structure of the device and its quasisteady-state operational characteristics, together with its operational limitations, are important. It is suggested that the second breakdown is a result of an expanding plasma wave. DOE

N83-16650# Lincoln Lab., Mass. Inst. of Tech., Lexington.

DEVELOPMENT OF A dc-TO-ac INVERTER BASED ON WAVESHAING

C. H. Cox, III, E. E. Landsman (American Power Conversion Corp., Burlington, Mass.), and N. E. Rasmussen (American Power Conversion Corp., Burlington, Mass.) Aug. 1982 54 p refs (Contract DE-AC02-76ET-20279)

(DE83-000660; DOE/ET-20279/191) Avail: NTIS HC A04/MF A01

A new topology for utility interactive dc-ac inverters was explored. The approach is limited to the single phase, 2 to 10 kW power levels typical of residential photovoltaic applications. The approach combines two of the three basic inverter operations, waveshaping and regulation, in a single dc-dc converter stage. The output of this stage is a full wave rectified sine wave. An inversion stage follows, performing the third basic inverter operation. The output is a current sine wave. This approach features unity power factor and less than 2% total current harmonic distortion. A 1 kW prototype was constructed using a buck converter for the dc-dc stage switching at approximately 20 kHz. Efficiency was generally above 90%. A cost breakdown of the prototype indicates that the inverter can be built to meet the cost goals for this class of inverter. DOE

N83-16651# Mound Lab., Miamisburg, Ohio.

EFFECT OF SINTERING PARAMETERS AND COMPOSITION ON THE RESISTIVITY OF A CERMET USED AS AN ELECTRICAL FEEDTHROUGH

D. P. Kramer, K. White, and M. D. Kelly 1982 13 p refs Presented at the 6th Ann. Conf. on Comosites and Ceramic Mater., Cocoa Beach, Fla., 17 Jan. 1982

(Contract DE-AC04-76DP-00053)

(DE82-005783; MLM-2890(OP); CONF-820115-2) Avail: NTIS HC A02/MF A01

The improvement of the electrical characteristics of an alumina/molybdenum cermet presently used as an electrical feedthrough was demonstrated. Samples of 50 wt % alumina/50 wt % molybdenum cermets were fabricated using 99% Al2O3 94% Al2O3 and 91% Al2O3. Sintering was performed at 1400 C, 1500 C, or 1600 C using three different hydrogen dew points (-45 C, -10 C, +25 C). After sintering, the resistivity of the cermet samples was measured by using a four-point probe technique. The results show that the resistivity of the cermet decreased significantly as the purity of the alumina used in the cermet decreased from 99% to 91% alumina. DOE

N83-16652# California Univ., Livermore. Lawrence Livermore Lab.

TESTS OF A LOW-PRESSURE SWITCH PROTECTED BY A SATURATING INDUCTOR

E. J. Lauer and D. L. Birx 20 Oct. 1981 16 p refs (Contracts W-7504-eng-48; N60921-81-LT-W0009; N60921-81-LT-W0026; DARPA Order 3718)

(DE82-005732; UCID-19230) Avail: NTIS HC A02/MF A01

A triggered low-pressure switch was tested switching a charged capacitor across a damping resistor simulating a transformer. A series saturating inductor protected the switch from electron beam anode damage. The capacitor was 15 micro F and charge voltages up to 50 kV were used. The time to current maximum was 5 to 8 micro S. The current terminated at about 50 micro S and voltage could be reapplied at about 100 micro S. DOE

N83-16653# General Electric Co., Schenectady, N. Y.

STOCHASTIC METHODS FOR ANALYSIS OF POWER FLOW IN ELECTRIC NETWORKS

Washington DOE Sep. 1982 46 p refs (Contract DE-AC01-78ET-29299)

(DE83-000445; DOE/ET-29299-1) Avail: NTIS HC A03/MF A01

The modeling and effects of probabilistic behavior on steady state power system operation were analyzed. A solution to the steady state network flow equations which adhere both to Kirchoff's Laws and probabilistic laws, using either combinatorial or functional approximation techniques was obtained. The development of sound techniques for producing meaningful data to serve as input is examined. Electric demand modeling, equipment failure analysis, and algorithm development are investigated. Two major development areas are described: a decomposition of stochastic processes which gives stationarity, ergodicity, and even normality; and a powerful surrogate probability approach using proportions of time which allows the calculation of joint events from one dimensional probability spaces. DOE

N83-16654# Brown Boveri Electric, Inc., Colmar, Pa.

FLEXIBLE GAS-INSULATED METAL-ENCLOSED TRANSMISSION-SYSTEM DESIGN Final Report

P. J. Kroon, P. C. Netzel, J. Z. Ponder, and E. M. Spencer Aug. 1982 139 p refs (EPRI Proj. 7837-1)

(DE82-906476; EPRI-EL-2563) Avail: NTIS HC A07/MF A01

A flexible gas insulated cable for power transmission applications from 138 to 345 kV is described. The use of corugated aluminum for the conductor and sheath permits a bend radius of 8.5 times the cable radius to allow reeling of the cable for shipment of long lengths by truck or rail. The successful installation and test of an earlier prototype cable is also described. A machine to continuously produce corrugated tubing was designed, fabricated and installed in its own building to serve as the basic tool with which to develop methods to permit continuous production of cable. A two piece injection molded insulating spacer was developed to permit continuous economical cable production. Numerous tests have demonstrated the outstanding dielectric properties of the basic material and the sinulator design. A series of tables and graphs is presented to facilitate determination of current carrying capacity under various conditions for above ground and underground installations. DOE

N83-16655# Bevilacqua (O. M.) and Associates, Oakland, Calif.
ELECTRIC VEHICLES IN ELECTRIC UTILITIES: A NATIONAL SURVEY Final Report
Nov. 1981 71 p refs Sponsored by DOE and EPRI
(DE82-901285; EPRI-EM-2131) Avail: NTIS HC A04/MF A01

The vehicle fleet characteristics, actual and potential electric vehicle uses in those fleets, and information transfer needs of electric utilities were determined. A large national electric utility fleet and a small but significant potential for incorporation of electric vehicles are indicated. It is concluded that utilities need major improvements in access to information on electric vehicles. DOE

N83-16656# Westinghouse Electric Corp., East Pittsburgh, Pa. Steam Turbine Generator Div.
ELECTRIC-GENERATOR MONITORING AND DIAGNOSTICS Final Report
F. T. Emery, M. Gottleib, and G. B. Brandt Aug. 1982 37 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 970-2)
(DE82-906463; EPRI-NP-2564-SY) Avail: NTIS HC A03/MF A01

The improvement of turbine generator availability by developing on line monitoring instrumentation capable of early detection of developing malfunctions was studied. A summary of the development work on an on line RF monitor and a fiber optic temperature sensor is presented. The RF monitor detects internal generator arcing and alerts the operator if the arcing level becomes destructively high. The fiber optic temperature sensor detects hot spots in generator stator windings, in a high voltage and high electromagnetic flux environment. DOE

N83-16657# Pacific Gas and Electric Co., San Ramon, Calif.
RESEARCH TO DEVELOP GUIDELINES FOR CATHODIC PROTECTION OF CONCENTRIC NEUTRAL CABLES, VOLUME 3 Final Report
J. A. Hanck and G. Nekoksa Aug. 1982 251 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1049-1)
(DE82-906480; EPRI-EL-1970-Vol-3) Avail: NTIS HC A12/MF A01

Data associated with the corrosion of concentric neutral (CN) wires of direct buried primary cables were statistically analyzed, and guidelines for cathodic protection of CN wires for the electric utility industry were developed. The cathodic protection are reported. Field tests conducted at 36 bellholes excavated in California, Oklahoma, and North Carolina are described. Details of the electrochemical, chemical, bacteriological, and sieve analyses of native soil and imported backfill samples are also included. DOE

N83-16658# Sandia Labs., Albuquerque, N. Mex.
RADIATION AND TEMPERATURE TOLERANT HYBRIDS
D. W. Palmer and B. L. Draper Dec. 1981 4 p refs Presented at the IEEE High Temp. and Electron. Instr. Conf., Houston, Tex., 7 Dec. 1981
(Contract DE-AC04-76DP-00789)
(DE82-010081; SAND-82-0032C; CONF-811213-5) Avail: NTIS HC A02/MF A01

The nuclear and space industries require electronics with higher tolerance to radiation than that commercially available. The recently developed 300 C electronics technology based on junction field-effect transistors and thick film hybridization was tested beyond 10 to the 9th power rad (Si) in a cobalt 60 gamma source and 10 to the 16th power neutrons/sq cm in an annular core rector. Circuits and individual components from this technology all survived these total doses although often required annealing at 200 C or 300 C to regain functionality. Radiation tolerance comparisons were made with military radhard CMOS, simplified linear I2L, and JFET technologies. Real time 200 to 300 C annealing should allow circuit functionality to even higher radiation levels. DOE

N83-16659# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
IDENTIFYING ELECTRICAL LOADS WHICH CAN USE DIRECT PHOTOVOLTAIC dc POWER
H. C. Goff, T. S. Chan, R. Allred, D. W. Dale, and J. A. Nichols Nov. 1981 204 p refs Prepared for Sandia Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE82-005716; SAND-80-7012) Avail: NTIS HC A10/MF A01

Direct current energy is used in several industrial and commercial applications including residential appliance type equipment that operates from dc, as used in recreational vehicles. These applications are reviewed to determine the potential for using photovoltaic generated power directly in the respective processes. Generally, the dc load requirements are very high or they require strict regulation. This limits the widespread introduction of PV generated power. The three most promising applications are water desalination, telephone switching stations and fluorescent lighting. DOE

N83-16660# Brown, Boveri und Cie, A.G., Mannheim (West Germany).
SF6: INSULATED SWITCHGEAR FOR DC VOLTAGES UP TO 600 KV Final Report, Dec. 1981
Volker Rees Bonn Bundesministerium fuer Forschung und Technologie Aug. 1982 69 p refs In GERMAN; ENGLISH Summary Sponsored by Bundesministerium fuer Forschung and Technologie
(BMFT-FB-T-82-143; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14

The development and testing of the main components of a metal clad SF6-insulated switch gear for dc voltages up to 600 kV are described. The technical requirements of the components were derived from the design of a switchgear arrangement. The switchgear was tested, proving that switching requirments were met. A metal clad measuring device for high dc voltages was developed. Long term tests with voltages up to 1 MV prove the insulation capability of the SF6/solid insulation. Author (ESA)

N83-16661# EUROSIL G.m.b.H., Munich (West Germany).
DEVELOPMENT OF A SILICON GATE CMOS TECHNOLOGY WITH SMALL STRUCTURES Final Report, Mar. 1981
Ivana Milosevic, Laurentiu Tilenschi, Ruediger Luft, and David Cornwell Bonn Bundesministerium fuer Forschung und Technologie Sep. 1982 101 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium Fuer Forschung und Technologie
(BMFT-FB-T-82-155; ISSN-0340-7608) Avail: NTIS HC A06/MF A01;Fachinformationszentrum, Karlsruhe, West Germany DM 21,50

The development of HCMOS technology for 3 to 4 microns structures in order to improve packing density and performance for very large scale integration CMOS circuits, operating at 1,5V, is outlined. Design rule definition, photolithography/contact and projection, layout techniques, and process development (high value polysilicon resistors) are discussed. The technology developed was successfully demonstrated on an advanced 4 MHz (1,5V) watch circuit. Author (ESA)

N83-16662# National Bureau of Standards, Washington, D.C.
ELECTRIC AND MAGNETIC FIELD MEASUREMENTS Annual Report, 1981
R. H. McKnight, F. R. Kotter, M. Misakian, and J. N. Hagler Jul. 1982 50 p refs Sponsored in part by DOE
(PB82-263377; NBSIR-82-2527) Avail: NTIS HC A03/MF A01 CSCL 09A

Methods for evaluating and calibrating instrumentation for use in measuring the electric field and various ion related electrical quantities in the vicinity of high voltage direct current transmission lines are developed. Apparatus designed to simulate the transmission line environment are also evaluated. GRA

N83-16663# National Materials Advisory Board, Washington, D. C. Committee on Evaluation of Industrial Hazards.

CLASSIFICATION OF DUSTS RELATIVE TO ELECTRICAL EQUIPMENT IN CLASS 2 HAZARDOUS LOCATIONS Final Report
Jul. 1982 64 p refs
(Contracts DL-J-9-F-5-0070; PHS-NIOSH-210-78-0120)
(PB82-263153; NMAB-353-4) Avail: NTIS HC A04/MF A01 CSCL 09C

Material presented in earlier National Materials Advisory Board reports is combined and revised to account for changes in the National Electrical Code that were made in 1981 and that reflect some of the recommendations of the Committee on Evaluation of Industrial Hazards. Classification rationale and methodologies are described and the classification listing is given. Author (GRA)

N83-16664# National Materials Advisory Board, Washington, D.C. Committee on Evaluation of Industrial Hazards.
RATIONALE FOR CLASSIFICATION OF COMBUSTIBLE GASES, VAPORS AND DUSTS WITH REFERENCE TO THE NATIONAL ELECTRICAL CODE Final Report
Jul. 1982 28 p refs
(Contracts DL-J-9-F-5-0070; PHS-NIOSH-210-78-0120)
(PB82-263179; NMAB-353-6) Avail: NTIS HC A03/MF A01 CSCL 09C

Serious reservations about the entire classification procedure of chemical compounds present in electrical equipment environments and the precepts on which it is based are discussed. Although some tests were conducted on selected key compounds, the committee primarily considered the chemical similarity of compounds and other known flammability properties and relied heavily on the experience and intuition of its members. The committee also recommended that the NEC grouping of dusts be changed in some ways and has reclassified dusts according to the modified version of the code. Author (GRA)

N83-16665# AEG-Telefunken, Ulm (West Germany). Tube and Construction Div.
GAS DISCHARGE MATRIX DISPLAYS Final Report
Kurt Fahrenschon, Werner Dirr, Wolfgang Hellwig, Hildegard Keiner, Guenther Peppel, and Helmut Suessenbach Aug. 1982 54 p refs Transl. into ENGLISH from the mono. "Rasteranzeigeschirm in Gasentladungstechnik" Nov. 1980 Sponsored by Bundesministerium fuer Forschung und Technologie
(PB82-266198; BMFT-FB-T-80-082) Avail: NTIS HC A04/MF A01 CSCL 09E

The theoretical and technological principles of pulsed gas discharge matrices with inherent memory were investigated. Based on results from study NT 474, the quality of the panel consisting of a priming channel, driftspace, and a display cell was enhanced. For the display cell, a design using a wire cathode is the most suitable. Time delay investigations indicate that certain ignition of the discharge channels can be obtained. The luminous density of the display panel developed exceeds that of all others to date. Author (GRA)

N83-16666# Siemens A.G., Munich (West Germany). Component Div.
FURTHER DEVELOPMENTS IN INTEGRATED CIRCUIT ASSEMBLING TECHNOLOGY
Hans Ullrich Sep. 1982 62 p Sponsored by Bundesministerium fuer Forschung und Technologie
(PB82-266867; BMFT-FB-T-80-179) Avail: NTIS HC A04/MF A01 CSCL 09E

Recent developments aiming at full automation in the assembling technology of plastic encapsulated integrated circuits (IC) are described, covering die separation, chip adhesion and wire bonding. For IC die separation in individual chips, a diamond sawing procedure which replaces the traditional scratch and break technique is proposed. Die attachment by means of a silver-filled adhesive was extended to MOS and power devices. A half-automated universal chip adhesion machine was designed and tested. A positioning system based on chip edge pattern recognition was developed. The prototype of a fully automated wire bonding system was successfully tested. The technical and economical advantages of these improved technologies are discussed. GRA

N83-16667# AEG-Telefunken, Heilbronn (West Germany). Semiconductor Div.
DESIGN METHODS FOR COMPLEX MOS SYSTEMS Final Report
Paul Sieber Aug. 1982 77 p refs Transl. into ENGLISH from a German mono., Aug. 1980 Original language document announced as N81-24370 Sponsored in part by Bundeminsterium fuer Forschung und Technologie
(PB82-254061; BMFT-FB-T-80-086) Avail: NTIS HC A05/MF A01 CSCL 09E

Methods and aids to design complex MOS systems were improved and tested on prototypes of new LSI components. The extension of the cell libraries for both manual and computer layouts resulted in reduced development time. By improvements in circuit design the yield of the CP3F microprocessor and the ultrasonic remote control chips was enhanced. Fundamentals of LSI testing with automated test systems were widened and by standardization of the procedures a shorter development time for new test programs and a better evaluation of components and test structures was achieved. Test programs for current products were optimized with respect to testing time. The introduction of the n-channel Si gate process was prepared by designing and testing special test structures. GRA

N83-17374*# Alabama Univ., Tuscaloosa. Dept. of Electrical Engineering.
ORIGIN AND CONTROL OF INSTABILITY IN SCR/TRIAC THREE-PHASE MOTOR CONTROLLERS
John J. Dearth *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 30 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 09A

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N83-16668*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL ASSESSMENT OF A COMPUTER PROGRAM USED IN SPACE SHUTTLE ORBITER ENTRY HEATING ANALYSIS
William L. Wells and JoAnn Hudgins Jan. 1983 23 p refs
(NASA-TM-84572; L-15515; NAS 1.15:84572) Avail: NTIS HC A02/MF A01 CSCL 20D

A high temperature reusable surface insulation (HRSI) tile taken from the Space Shuttle orbiter was subjected to a nominal heating rate of 60 kW/sq m in the laboratory. The surface temperature response to this heating was measured and used as input to a computer program which computed the applied heating rate. The program is part of a software system that is used to infer convective heating rates to the orbiter thermal protection system during entry. The measured and computed heating rates are compared. Results confirm the applicability of this program to the determination of flight heat transfer rates from flight measured surface temperature data. Author

N83-16669*# Cooper Union, New York.
A COMPREHENSIVE MODEL TO DETERMINE THE EFFECTS OF TEMPERATURE AND SPECIES FLUCTUATIONS ON REACTION RATES IN TURBULENT REACTING FLOWS Semiannual Status Report, 1 Aug. 1982 - 31 Jan. 1983
D. Goldstein, F. Magnotti, and W. Chinitz 1983 81 p refs
(Grant NAG1-18)

(NASA-CR-169767; NAS 1.26:169767) Avail: NTIS HC A05/MF A01 CSCL 20D

Reaction rates in turbulent, reacting flows are reviewed. Assumed probability density functions (pdf) modeling of reaction rates is being investigated in relation to a three variable pdf employing a 'most likely pdf' model. Chemical kinetic mechanisms treating hydrogen air combustion is studied. Perfectly stirred reactor modeling of flame stabilizing recirculation regions was used to investigate the stable flame regions for silane, hydrogen, methane, and propane, and for certain mixtures thereof. It is concluded that in general, silane can be counted upon to stabilize flames only when the overall fuel air ratio is close to or greater than unity. For lean flames, silane may tend to destabilize the flame. Other factors favoring stable flames are high initial reactant temperatures and system pressure. S.L.

N83-16670*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

TESTS OF A 2-STAGE, AXIAL-FLOW, 2-PHASE TURBINE Final Report

David G. Elliott 15 Dec. 1982 34 p refs Sponsored by NASA (Contract DE-AI01-80ER-10614)

(NASA-CR-169789; JPL-Pub-82-98; NAS 1.26:169789; DOE/ER-10614-2) Avail: NTIS HC A03/MF A01 CSCL 20D

A two phase flow turbine with two stages of axial flow impulse rotors was tested with three different working fluid mixtures at a shaft power of 30 kW. The turbine efficiency was 0.55 with nitrogen and water of 0.02 quality and 94 m/s velocity, 0.57 with Refrigerant 22 of 0.27 quality and 123 m/s velocity, and 0.30 with steam and water of 0.27 quality and 457 m/s velocity. The efficiencies with nitrogen and water and Refrigerant 22 were 86 percent of theoretical. At that fraction of theoretical, the efficiencies of optimized two phase turbines would be in the low 60 percent range with organic working fluids and in the mid 50 percent range with steam and water. The recommended turbine design is a two stage axial flow impulse turbine followed by a rotary separator for discharge of separate liquid and gas streams and recovery of liquid pressure. M.G.

N83-16671*# Southern Methodist Univ., Dallas, Tex. Dept. of Mechanical Engineering.

EXPERIMENTAL MEASUREMENTS OF UNSTEADY TURBULENT BOUNDARY LAYERS NEAR SEPARATION Final Report, 1 Dec. 1978 - 31 Aug. 1982

Roger L. Simpson Nov. 1982 28 p refs

(Grant NsG-2354)

(NASA-CR-169674; NAS 1.26:169674) Avail: NTIS HC A03/MF A01 CSCL 20D

Investigations conducted to document the behavior of turbulent boundary layers on flat surfaces that separate due to adverse pressure gradients are reported. Laser and hot wire anemometers measured turbulence and flow structure of a steady free stream separating turbulent boundary layer produced on the flow of a wind tunnel section. The effects of sinusoidal and unsteadiness of the free stream velocity on this separating turbulent boundary layer at a reduced frequency were determined. A friction gage and a thermal tuft were developed and used to measure the surface skin friction and the near wall fraction of time the flow moves downstream for several cases. Abstracts are provided of several articles which discuss the effects of the periodic free stream unsteadiness on the structure or separating turbulent boundary layers. A.R.H.

N83-16672# Toronto Univ. (Ontario). Inst. for Aerospace Studies.

AN ANALYTICAL AND NUMERICAL STUDY OF A SHOCK WAVE INTERACTION WITH AN AREA CHANGE

D. R. Greatrix and J. J. Gottlieb Nov. 1982 147 p refs

(UTIAS-2668; ISSN-0082-5255) Avail: NTIS HC A07/MF A01 CSCL 20D

The wave motion resulting from the passage of a shock wave through a gradual monotonic area change of finite length in a channel was studied both analytically and numerically. The domains and boundaries of different predicted wave patterns for both an area enlargement and area reduction were calculated for a perfect monatomic, diatomic and polyatomic gas. Author

N83-16673# Toronto Univ. (Ontario). Inst. for Aerospace Studies.

LAMINAR BOUNDARY LAYERS BEHIND BLAST AND DETONATION WAVES

Xixing Du, W. S. Liu, and I. I. Glass Aug. 1982 78 p refs Sponsored by Army Research Office and Natural Sciences and Engineering Research Council of Canada

(Grant AF-AFOSR-0092-82)

(UTIAS-259; ISSN-0082-5255) Avail: NTIS HC A05/MF A01

Boundary layer flows in air behind nonuniform strong blast waves and in the burned gas of a stoichiometric mixture of hydrogen and oxygen behind uniform Chapman-Jouguet detonation waves were investigated. The results show that the Prandtl number profoundly influences boundary layer flow. For a blast wave and Pr less than unity it controls a boundary layer velocity overshoot which decreases with increasing Prandtl number. For a Chapman-Jouguet detonation wave similar results are obtained for a Pr = 0.72; however, for an actual Pr = 2.26, a flow reversal occurs away from the wave where the inviscid flow velocity approaches a small value. The viscous exponent was found to have a significant effect on the wall shear stresses and heat transfer. The effect of the wall temperature is small. Velocity profiles were computed for spherical and planar detonation waves. Because of the rapid decrease in density behind a blast wave, the boundary layer thickness becomes very much larger than their detonation wave counterparts at the same wave velocity (but different physical conditions). The velocity boundary layer thickness in air behind a quasistationary planar shock wave is somewhat more than for a planar detonation wave at the same wave velocity (but in different gases). The heat transfer to the wall behind a planar detonation wave was calculated. A.R.H.

N83-16674*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

FLOW IN A TORSIONALLY OSCILLATING FILLED CYLINDER

Charles F. Schafer Jan. 1983 20 p refs

(NASA-TP-2115; NAS 1.60:2115) Avail: NTIS HC A02/MF A01 CSCL 20D

The flow of a liquid in a completely filled cylinder undergoing torsional oscillations about its longitudinal symmetry axis was studied analytically and experimentally. The objective of the studies was to determine the efficacy of the torsional oscillations in mixing the confined liquid. Flow was found to be confined primarily to toroidal cells at the ends of the cylinder. Cell thickness was about equal to the cylinder radius. The use of baffles at the end walls was shown to enhance the mixing process. Author

N83-16675*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PRESSURES, FORCES, MOMENTS AND SHOCK SHAPES FOR A GEOMETRICALLY MATCHED SPHERE-CONE AND HYPERBOLOID AT MACH 20.3 IN HELIUM

Robert L. Calloway Jan. 1983 73 p refs

(NASA-TP-2100; L-15499; NAS 1.60:2100) Avail: NTIS HC A04/MF A01 CSCL 20D

An investigation was conducted to compare measured and predicted pressure distributions, forces and moments, and shock shapes on a geometrically matched sphere-cone and hyperboloid. A hyperboloid with a nose radius of 0.5276 in. and an asymptotic angle of 39.9871 deg was matched to a sphere-cone with a nose radius of 0.750 in. and a cone half-angle of 45 deg. Experimental results in helium at a free-stream Mach number of 20.3 and a free-stream unit Reynolds number of 6.83 x 10 to the 6th power per foot were combined with predicted results from a theoretical method to compare the two shapes. Comparisons of experimental results showed small differences in the two shapes, but the prediction method provided better results for the hyperboloid than for the sphere-cone. Author

N83-16676*# Lockheed Missiles and Space Co., Huntsville, Ala.
DEVELOPMENT AND APPLICATION OF THE GIM CODE FOR THE CYBER 203 COMPUTER Interim Report
J. F. Stainaker, M. A. Robinson, E. G. Rawlinson, P. G. Anderson, A. W. Mayne, and L. W. Spradley Washington NASA Dec. 1982 179 p refs
(Contracts NAS1-15783; NAS1-15795)
(NASA-CR-3652; NAS 1.26:3652; LMSC-HREC-TD-D784478) Avail: NTIS HC A09/MF A01 CSCL 20D

The GIM computer code for fluid dynamics research was developed. Enhancement of the computer code, implicit algorithm development, turbulence model implementation, chemistry model development, interactive input module coding and wing/body flowfield computation are described. The GIM quasi-parabolic code development was completed, and the code used to compute a number of example cases. Turbulence models, algebraic and differential equations, were added to the basic viscous code. An equilibrium reacting chemistry model and implicit finite difference scheme were also added. Development was completed on the interactive module for generating the input data for GIM. Solutions for inviscid hypersonic flow over a wing/body configuration are also presented. S.L.

N83-16677*# Virginia Research Associates, Blacksburg.
EXPERIMENTAL STUDY OF SURFACE PRESSURES INDUCED ON A FLAT PLATE AND A BODY OF REVOLUTION BY VARIOUS DUAL JET CONFIGURATIONS
J. A. Schetz and A. K. Jakubowski Dec. 1982 82 p refs
(Contract NAS2-10437)
(NASA-CR-166422; NAS 1.26:166422) Avail: NTIS HC A05/MF A01 CSCL 20D

The effect of the angle of a jet to a crossflow, the performance of dual jet configurations, and a jet injected from a body of revolution as opposed to a flat plate were investigated during experiments conducted in the 7x10 tunnel at NASA Ames at Velocities from 14.5 m/sec to 35.8 m/sec (47.6 to 117.4 ft/sec.). Pressure distributions are presented for single and dual jets over a range of velocity ratios from 2 to 10, spacings from 2 to 6 diameters and injection angles of 90, 75, 60, and 105 degrees. For the body of revolution tests, the ratio of the jet to body diameters was set as large (1/2) in order to be more representative of V/STOL aircraft applications. Flat plate tests involved dual jets both aligned and in side by side configurations. The effects of the various parameters and the differences between the axisymmetric and planar body geometrics on the nature, size, shape, and strength of the interaction regions on the body surfaces are shown. Some flowfield measurements are also presented, and it is shown that a simple analysis is capable of predicting the trajectories of the jets. A.R.H.

N83-16678*# Pennsylvania State Univ., University Park. Turbomachinery Lab.
END WALL FLOWS IN ROTORS AND STATORS OF A SINGLE STAGE COMPRESSOR Semiannual Progress Report
T. R. Govindan, K. N. S. Murthy, and B. Lakshminarayana Jan. 1983 25 p refs
(Grant NsG-3212)
(NASA-CR-169800; NAS 1.26:169800; PSU/Turbo-R83-2) Avail: NTIS HC A02/MF A01 CSCL 20D

A computer code for solving the parabolized Navier-Stokes equations for internal flows was developed. Oscillations that develop in the calculation procedure are discussed. The measurements made in the hub and annulus wall boundary layers are summarized. The flow in the hub wall boundary layer, starting ahead of the inlet guide vanes to the inlet of the rotor is traced. S.L.

N83-16679*# Pennsylvania State Univ., University Park. Turbomachinery Lab.
THREE DIMENSIONAL FLOW FIELD INSIDE COMPRESSOR ROTOR, INCLUDING BLADE BOUNDARY LAYERS Semiannual Progress Report
M. Pouagare, B. Lakshminarayana, and J. M. Galmes Jan. 1983 52 p refs
(Grant NsG-3266)
(NASA-CR-169788; NAS 1.26:169788; PSU/TURBO-83-1) Avail: NTIS HC A04/MF A01 CSCL 20A

The space marching code was modified in order to be able to predict the flow field inside a rotor passage, including the blade and hub wall boundary layers. The basic changes incorporated are modifications of the equations so that the code can handle three dimensional configurations with changes in the radial direction (for example changes in stagger angle, blade camber and thickness), extensions and modifications in order to implement a physically realistic turbulence model such as a k sigma model and an algebraic Reynolds stress model. S.L.

N83-16680*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MECHANICS OF LIQUID HELIUM IN A PARTIALLY FILLED ROTATING DEWAR IN LOW GRAVITY WITH APPLICATION TO GRAVITY PROBE-B
C. F. Schafer and S. A. Lowry Jan. 1983 45 p refs
(NASA-TP-2124; NAS 1.60:2124) Avail: NTIS HC A03/MF A01 CSCL 20D

The Gravity Probe-B spacecraft is composed largely of a liquid helium dewar containing an experiment package. It is shown that an unsymmetric liquid helium distribution in the dewar can cause unacceptably high forces, gravitational and gravity gradient forces, at the experiment location. It is further shown that for the planned spacecraft configuration and operational parameters, it is very likely that the liquid helium distribution in the dewar will be unsymmetric. The required symmetry can be attained by using higher operational spacecraft rotation rates. S.L.

N83-16681# Naval Ship Research and Development Center, Bethesda, Md. Ship Performance Dept.
A VARIATIONAL PRINCIPLE ASSOCIATED WITH A LOCALIZED NUMERICAL SOLUTION OF UNSTEADY FREE-SURFACE FLOWS Final Report
B. Yim Sep. 1982 23 p refs
(RR0140302)
(AD-A120010; DTNSRDC-82-077) Avail: NTIS HC A02/MF A01 CSCL 20/4

In this report, a variational principle for unsteady body wave problems is treated both with and without a convolution integral and with both linear and nonlinear free-surface conditions. Functionals are obtained for the numerical computation of unsteady flow fields near a body that moves on or beneath the free surface. This formulation can be applied to ship hydrodynamic performance problems of water entry and body slamming, as well as to arbitrary body motion. Author (GRA)

N83-16682# California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Mechanical Engineering.
DEVELOPING TURBULENT FLOW IN A 180 DEGREE BEND AND DOWNSTREAM TANGENT OF SQUARE CROSS-SECTIONS Annual Technical Report, 1 Oct. 1981 - 30 Sep. 1982
J. A. C. Humphrey, S. M. Chang, and A. Modavi Sep. 1982 98 p refs
(Contracts N00014-80-C-0031; DE-AC03-76SF-00098; NR Proj. 097-440)
(AD-A120613; LBL-14844; ATR-3) Avail: NTIS HC A05/MF A01 CSCL 20/4

A detailed account is given of the experimental and numerical modeling activities for the research period, relating to turbulent flow in a 180 deg curved duct. The measurements show variations in the flow field which, while understood, are not predictable by a K-epsilon model of turbulence. Numerical diffusion and exaggerated physical diffusion in the turbulence model are believed to be the major causes for the discrepancies observed. The new experimental data offered here should be of value for extending the theoretical base for the improved understanding and modeling of 3-D turbulent flows. Recommendations are made for continuing work. GRA

N83-16683# Illinois Inst. of Tech., Chicago. Dept. of Mechanical Engineering.
COOPERATIVE INVESTIGATION OF JET FLOWS Annual Technical Report, 1 Apr. 1981 - 31 Mar. 1982
Robert E. Drubka, Hassan M. Nagib, Roger E. Arndt (Minnesota Univ.), and William K. George (State Univ. of New York at Buffalo) Jun. 1982 25 p refs
(Contract F49620-80-C-0053; AF Proj. 2307)
(AD-A120511; AFOSR-82-0903TR) Avail: NTIS HC A02/MF A01 CSCL 20/1

With the help of a carefully designed and operated laser Doppler velocimeter, data were collected in an axisymmetric jet under controlled laboratory conditions. This data were found to conserve momentum; a problem which plagued most previous measurements. This resulted in near perfect agreement with the predictions of Reynolds stress models of turbulent jets. Far and near field sound measurements for a range of Mach and Reynolds numbers provided clues to the mechanism which lead to enhancing the broad band noise at high Reynolds numbers in presence of pure-tone excitation while suppressing it at low Reynolds numbers. At low Reynolds numbers the excitation leads to augmentation of the coherent large scale structures. At sufficiently high Reynolds number, noise due to the interaction of the wave-like structures with incoherent fine-scale turbulence may be dominant. This may also explain the differences in level of radiated noise from high and low Reynolds number jets. Controlling the jet with pure tone excitation, that enhances the helical mode of its instability, resulted in a suppression of the radiated noise by approximately 8dB. In general we find that a great deal of appreciation of the jet flowfield can be gained by viewing the jet as a nonparallel shear flow which is always susceptible to instabilities. In all cases, the instability of turbulent layers and the role of helical modes and upstream influence appear to be key mechanisms in our findings. GRA

N83-16684# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA MECHANICA SINICA (SELECTED ARTICLES)
Guocan Ling, Xieyuan Yin, Jinliang Jiang, and Kaitai Li 19 Aug. 1982 58 p refs Transl. into ENGLISH from Acta Mech. Sinica (China), no. 1, 1982 p 18-25, 34-41, 55-62, 97-103
(AD-A120581; FTD-ID(RS)T-0619-82) Avail: NTIS HC A04/MF A01 CSCL 20/4

Selected articles on fluid mechanics and heat transfer are presented. Topics discussed are: (1) the secondary vortex and the karman vortex formation; (2) viscous compressible flow in turbomachinery; (3) partial differential equations satisfied by stream functions in three dimensional turbomachinery flow; and (4) iridium electrostatic probe and its application in a high temperature wind tunnel. GRA

N83-16685# Naval Research Lab., Washington, D. C.
ADAPTATION OF FLUX-CORRECTED TRANSPORT ALGORITHMS FOR MODELLING BLAST WAVES
D. L. Book, J. P. Boris, M. A. Fry, R. H. Guirguis, and A. L. Kuhl 12 Oct. 1982 33 p refs
(DNA Proj. Y99-QAXS)
(AD-A120585; NRL-MR-4914) Avail: NTIS HC A03/MF A01 CSCL 20/4

Flux-corrected transport represents an accurate and flexible class of methods for solving nonsteady compressible flow problems. In models which treat all the physical effects required for blast wave simulation, truncation errors inherent in the underlying finite-difference scheme are exacerbated by nonlinear coupling between the fluid equations and by the greater complexity of the phenomena being simulated. In order to improve the properties of the basic difference scheme, we propose a new algorithm for integrating generalized continuity equations over a timestep delta t. GRA

N83-16686# Los Alamos Scientific Lab., N. Mex.
ELECTRODE SHAPES FOR SPHERICAL PIERCE FLOW
D. W. Mueller 1981 4 p refs Presented at the Linear Acclerator Conf., Santa Fe, N. Mex., 19-21 Oct. 1981
(Contract W-7405-eng-36)
(DE82-002623; LA-UR-81-3267; CONF-811083-4) Avail: NTIS HC A02/MF A01

The problem of obtaining the electrode shapes to produce a conically converging proton beam that has constant current density over each spherical surface of convergence is treated in spherical coordinates. A cone is taken from the Langmuir and Blodgett solution for the region within, and at the edge of, the conically converging beam. A solution for the LaPlace equation, required for the region outside the beam, is in terms of a power series in r and the Legendre polynomials of cos phi V(r,phi)=(A sub n)(P sub n)r(n). DOE

N83-16687# California Univ., Livermore. Lawrence Livermore Lab.
USER'S MANUAL FOR PELE3D: A COMPUTER CODE FOR THREE-DIMENSIONAL INCOMPRESSIBLE FLUID DYNAMICS
W. H. McMaster 7 May 1982 43 p refs
(Contract W-7405-eng-48)
(DE82-014892; UCID-19375) Avail: NTIS HC A03/MF A01

The PELE3D code is a three-dimensional semi-implicit Eulerian hydrodynamics computer program for the solution of incompressible fluid flow coupled to a structure. The fluid and coupling algorithms have been adapted from the previously developed two dimensional code PELE-IC. The PELE3D code is written in both plane and cylindrical coordinates. The coupling algorithm is general enough to handle a variety of structural shapes. The free surface algorithm is able to accommodate a top surface and several independent bubbles. The code is in a developmental status since all the intended options have not been fully implemented and tested. Development of this code ended in 1980 upon termination of the contact with the Nuclear Regulatory Commission. DOE

N83-16688# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.
OPTIMAL HEAT PUMPS FOR SOLAR-ASSISTED HEAT-PUMP SYSTEMS
Mark A. Catan 1981 7 p refs Presented at the Intern. Solar Energy Soc. Solar World Forum, Brighton, England, 23-28 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE82-004798; BNL-30140; CONF-810865-5) Avail: NTIS HC A02/MF A01

Work at Brookhaven National Laboratory (BNL) investigates the design of optimal heat pumps for solar assisted heat pump (SAPH) systems. Heat pump designs suitable for two generic systems, identified in the course of recent analytical work, are being studied. These are series SAHP systems operating at evaporator temperatures in the -5 to 10 C range and those operating at evaporator temperatures in the 10 to 35 C range. A heat pump simulator has been constructed with liquid based source subsystem and two load subsystems, one for testing air cooled condensers and one for testing water cooled condensers. Heat pumps tested were composed of various components including several types of variable and fixed capacity compressors, two types of expansion devices, and heat exchangers varying in size and type. DOE

N83-16689# General Electric Co., St. Petersburg, Fla. Chemistry Lab.
CALIBRATION PROCEDURES FOR STANDARD GAS LEAKS
T. K. Mehrhoff and T. M. Mason 11 Dec. 1981 27 p refs
(Contract DE-AC04-76DP-00656)
(DE82-005120; GEPP-TIS-601) Avail: NTIS HC A03/MF A01

Calibration procedures for equipment used in measuring flow rates of standardized gas leaks using a mass spectrometer are discussed. The calibration involves measurements of temperature, time, pressure and volume. The mass spectrometer is calibrated with a calibrated micromanometer and pure gas. The micromanometer is calibrated using a volume expansion method and a quartz fiber manometer in the torr range. Apparent volumes in the mass spectrometer inlet systems are calibrated using a quartz fiber

manometer. Error analysis is made by using the partial derivative method and the square root of the sum of squares method. The following error contributions were determined: volume +-0.6% temperature +-3.6% (helium only), time +-0.4%, pressure +-4.6%. For helium diffusion leaks an additional error 0.6% was determined as the contribution for alpha the temperature correction factor. DOE

N83-16690# California Univ., Berkeley. Lawrence Berkeley Lab. Solar Group.
DESIGN AND CONSTRUCTION OF A HIGH-TEMPERATURE GAS RECEIVER UTILIZING SMALL PARTICLES AS THE HEAT EXCHANGER (SPHER), PHASE 1 Progress Report, Jun. - Dec. 1981
Arlon J. Hunt and David B. Evans 1981 69 p refs Prepared for Solar Thermal Test Facilities, Albuquerque, N. Mex.
(Contract DE-AC03-81SF-11492)
(DE83-000047; LBL-13755) Avail: NTIS HC A04/MF A01

The principles, design philosophy, and construction of a (SPHER) receiver are described. The system consists of two major components, the particle generator and the receiver. Optical properties and thermal properties of small particle suspensions and particle production and oxidation are presented. The instrumentation to monitor the operation of the particle generator and reciever is described. Particle generator test results are described. The performance analysis of a SPHER is included. DOE

N83-16691# Westinghouse Electric Corp., Pittsburgh, Pa. Nuclear Energy Systems Div.
FULL-SCALE CONTROLLED TRANSIENT HEAT-TRANSFER TESTS DATA-ANALYSIS REPORT Final Report
B. A. McIntyre and E. C. Volpenhein Aug. 1982 284 p refs
(EPRI Proj. 494-1)
(DE82-906460; EPRI-NP-2547) Avail: NTIS HC A13/MF A01

Transient critical heat flux (CHF) behavior was studied under conditions typical of those calculated to occur in the first few seconds following a postulated large break loss of coolant accident (LOCA) in a pressurized water reactor (PWR). The axial power profile was a chopped cosine with a 1.66 peak to average power ratio. The primary focus was to obtain a data base, for transient CHF in a rod bundle cooled by water, amenable to model development efforts. A single controlled parameter variation approach was utilized. The parameters variation included pressure, pressure decay rate, flow, flow decay rate, flow direction, power, inlet temperature, and initial system pressure. These parameters are selected to bound the values which are calculated to occur during a large break PWR LOCA. DOE

N83-16692# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
MEASUREMENT OF SOLAR MOTION IN GAS FLUIDIZED BEDS Technical Progress Report, 1 Sep. - 30 Nov. 1981
M. M. Chen and B. T. Chao 1981 9 p
(Contract DE-FG22-81PC-40804)
(DE82-010713; DOE/PC-40804/T1) Avail: NTIS HC A02/MF A01

The emphasis of the work during this first quarter of the project has been on project initiation. This includes site preparation, purchasing additional data acquisition and computer equipment, modification of the fluidized bed and the computer-aided particle tracking facility. These are described in detail. DOE

N83-16693# Oak Ridge National Lab., Tenn.
ADVANCED TWO-PHASE FLOW INSTRUMENTATION PROGRAM
J. E. Hardy, S. C. Rogers, G. N. Miller, and W. L. Zabriskie Mar. 1982 24 p refs
(Contract W-7405-eng-26)
(DE82-009151; ORNL/TM-8231-Vol-4; NUREG/CR-2204-Vol-4) Avail: NTIS HC A02/MF A01

The performance of the Westinghouse Reactor Vessel Level Indicating System (RVLIS) during tests S-UT-6 and S-UT-7 (5% cold-leg breaks in the Semiscale Test Facility) was analyzed. The RVLIS, a system employing differential pressure (dP) cells, gave estimates of vessel level similar to those of Semiscale level instrumentation when measuring over equal spans. These RVLIS measurements are conservative to vessel coolant levels for both S-UT-6 and S-UT-7. At times, the RVLIS indications are greater than the vessel collapsed liquid level measured by Semiscale instrumentation. During S-UT-6, level estimate differences between RVLIS and Semiscale dPs of up to 215 cm (85 in.) were observed. These discrepancies may be explained by differences in Semiscale and Westinghouse pressurized-water reacto internal designs. Excellent agreement was noted between Semiscale and Westinghouse vessel levels for S-UT-7, an upper-head injection test. DOE

N83-16694# Argonne National Lab., Ill. Components Technology Div.
LOCAL VOLUME-AVERAGED TRANSPORT EQUATIONS FOR MULTIPHASE FLOW IN REGIONS CONTAINING DISTRIBUTED SOLID STRUCTURES
W. T. Sha, B. T. Chao (Illinois Univ., Urbana), and S. L. Soo (Illinois Univ., Urbana) Dec. 1982 57 p refs
(Contract W-31-109-eng-38)
(DE82-010894; ANL-81-69; NUREG/CR-2354) Avail: NTIS HC A04/MF A01

Local volume averaged conservation equations for multiphase flow in regions containing a distributed fixed solid structure with heat transfer are treated. In addition to the usual concept of volume porosity and distributed resistance, the anisotropic nature of the porous media is accounted for by formulating the equations in terms of velocities of phases associated with directional surface permeability. The resulting basic equations are in the form of differential integral transport equations with probability integrals based on the configurations and velocities of the interface. Limiting cases of pure stratified flow and highly dispersed mixture flow are noted. Validity and basis of the governing equations used in the COMMIX-2 code at its present stage of development are demonstrated. DOE

N83-16695# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
A NUMERICAL MODEL FOR GAS-DROPLET FLOW APPLICATION TO LIQUID SPRAY AND COOLING TOWERS
P. Weinacht and J.-M. Buchlin Jul. 1982 116 p refs
(VKI-TN-144) Avail: NTIS HC A06/MF A01

A two dimensional model consisting of coupled sets of equations governing the gas and liquid phases is presented. Modeling the gas phase as a continuum allows use of the Navier-Stokes equations with momentum source terms included. The particle-gas momentum exchange and the influence of the gas flow on the droplet trajectories results in a coupling of both of these sets of equations. Numerical solution of these equations is made in an iterative fashion by solving first the liquid phase equations and then the gas phase equations until a steady state solution is reached. Solution of the liquid phase equations by a fourth order Runge-Kutta method allows subsequent determination of the droplet-gas momentum exchange field. The degrading effect of wind on a spray curtain is demonstrated, though calculations show that curtain performance can be improved by tilting the nozzle into the wind. Author (ESA)

N83-16696# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
ROTATING STALL IN VANELESS DIFFUSERS OF CENTRIFUGAL COMPRESSORS
R. vandenBraembussche Jun. 1982 54 p refs
(VKI-TN-145) Avail: NTIS HC A04/MF A01

The distinction between impeller and diffuser rotating stall; the triggering mechanism of diffuser rotating stall and resulting flow patterns; and stability criteria for diffuser rotating stall and prediction of relative rotational speeds are discussed. Comparison of the unsteady flow patterns observed at rotor inlet and inside the vaneless diffusor indicates distinction should be made between impeller rotating stall and diffuser rotating stall. The unsteady flow theory of Jansen is shown to provide a valuable prediction of

diffuser rotating stall, if combined with an improved boundary layer calculation method. Author (ESA)

N83-16697# Bristol Univ. (England). Dept. of Aeronautical Engineering.
THE FILLING EFFECT OF EXIT BLOCKAGES ON DIFFUSER PERFORMANCE AND EXIT PROFILES B.S. Thesis
M. J. Fautley and C. A. Lee Jun. 1982 46 p refs
(BU-277) Avail: NTIS HC A03/MF A01

The filling effect on wide angle diffuser exit total pressure profiles of blockages at the diffuser exit was investigated. Testing of gauze and perforated plate combinations was undertaken to obtain blockage pressure drops comparable to heat exchangers used by Rolls Royce. Diffuser exit profiles with and without blockages were compared. An approximation to a heat exchanger blockage was tested in wide angle diffusers and sudden enlargements, and their exit profiles were examined. It is shown that the location of a blockage at a duct expansion exit improves the efficiency of the expansion and gives a more even total pressure distribution forward of the blockage. All tests were carried out with an inlet Reynolds number in the range 68,500 to 205,000. Author (ESA)

N83-16698# Bristol Univ. (England). Dept. of Aeronautical Engineering.
INLET AND OUTLET PRESSURE LOSSES WITH A CROSS-FLOW B.S. Thesis
G. Clarkson and C. Hendry Jun. 1982 45 p refs
(BU-278) Avail: NTIS HC A03/MF A01

The static pressure losses associated with fluid inlets and outlets, in a cross-flow, were studied for a number of different designs and velocity ratios, using a large duct with a pipe joining one of the walls. Air flowed through both and static pressures were measured. It is found that for an inlet the pressure loss is reduced by decreasing the angle between the pipe and the duct, and rounding the entry to the pipe on the duct wall. For the outlet pressure loss is again reduced by decreasing the angle between the duct and pipe, although there is no gain from rounding the exit junction. Overall the pressure gain at entry is less than the pressure loss at exit for a certain velocity ratio. With increasing velocity ratio the pressure loss for inlet flow decreases and becomes a pressure gain, while for outlet flow the loss increases. Author (ESA)

N83-16699# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
ESCIMO APPLIED TO THE HYDROGEN-AIR DIFFUSION FLAME, WITH REFINED TREATMENT OF BIOGRAPHY: REPORT AND COMPUTER PROGRAM
W. C. Fan Aug. 1982 49 p refs
(CFD/82/9) Avail: NTIS HC A03/MF A01

The governing equation of biography is solved by a finite difference method instead of a profile method. The characteristics of the proposed method are described and the results are compared to those from a profile method. The results are shown to be almost the same, but the computer execution time of the profile method is 2.4 times longer. A GENMIX type computer program and DEMO and BIOG subroutines which were implemented for the study are described. Author (ESA)

N83-16700# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
A NOTE ON THE NUMERICAL SOLUTION PROCEDURES USED IN THE LAURA COMPUTER CODE AND IN OTHER CODES FOR NUCLEAR-REACTOR THERMAL HYDRAULICS
Brian Spalding Sep. 1982 35 p refs
(CFD/82/11) Avail: NTIS HC A03/MF A01

Distinguishing features of the numerical formulations, and of the solution procedures, employed in the loop analysis of unsteady reactor and ancillary equipment behavior (LAURA) computer code, and of their similarities to and distinctions from those of other thermal hydraulics codes are described. Attention is concentrated on the distinction between fully-implicit and partially-explicit formulations, and on the question of how many interactions are accounted for in the pressure-correction equation. It is shown that fully-implicit formulations permit adequate explorations of what grid and time step are necessary for accuracy. Because of the way in which nuclear safety codes are constructed, the grids which they are forced to employ, for economic reasons, are far too coarse to give any grounds for belief in their numerical accuracy. Author (ESA)

N83-16701# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
FLOW FIELD OF A SONIC JET EXHAUSTING INTO A COUNTERFLOW [DAS STROEMUNGSFELD BEI AUSBLASUNG EINES SONISCHEN STRAHLS IN EINE GEGENLAEUFIGE STROEMUNG]
Paolo Moraes, Jr. 1982 72 p refs In GERMAN
(ILR-52; ISBN-3-7983-0823-3; ISSN-0341-0587) Avail: NTIS HC A04/MF A01

The flow field resulting from the exhausting of a rotationally symmetric jet in counterflow was experimentally investigated for flow Mach numbers = 0.5 and 2.0 and for several pressure ratios (secondary jet pressure/main flow pressure). Static pressure measurements on the front and upper plane of the exhaust body, Schlieren and oil film photography, temperature and laser velocity measurements in the flow field were used. A flow model was constructed. A numerical calculation of a part of the flow field was made using the method of characteristics and a time dependent approximation method. Author (ESA)

N83-16702# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
RELATIONSHIPS BETWEEN WALL PRESSURE AND VELOCITY FLUCTUATIONS IN TURBULENT PIPE FLOW (EXPERIMENTAL INVESTIGATION)
Thomas Langeheineken 1981 129 p refs In GERMAN; ENGLISH summary
(MPIS-Mitt-70; ISSN-0374-1257) Avail: NTIS HC A07/MF A01

Fluctuating components of the wall pressure, of the streamwise velocity, and of the velocity perpendicular to the wall were measured simultaneously in a fully developed, turbulent, pipe flow. Using the method of conditional signal averaging, the relationship between high amplitude pressure fluctuations at the pipe wall and the velocity field in the flow was measured. The measurements show that the occurence of high amplitude positive and negative peaks in the wall pressure are closely connected to the velocity field, which contains long narrow streaks with high and low velocity. The occurence of high amplitude wall pressure peaks is related to the behavior of the velocity field, which is assumed to occur during a burst. A flow model consisting of vortex tubes similar to horseshoe vortices is established, to explain the main features in the measurements. Author (ESA)

N83-16703# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
AN EXPERIMENTAL INVESTIGATION OF A PROBE INTERFERENCE IN THE NEAR WALL REGION IN A TURBULENT CHANNEL FLOW
Horst Klages 1981 63 p refs In GERMAN; ENGLISH summary
(MPIS-Mitt-71; ISSN-0374-1257) Avail: NTIS HC A04/MF A01

Space-time correlations in an oil flow channel were studied using hot-film probes. The measurements were made within the viscous sublayer and adjacent wall region at Reynolds number 7770, based on the channel width and the mean centreline velocity. The viscous sublayer is 3 mm. The measurements show changes of sign for correlations of the fluctuating velocity component and the corresponding gradient at the wall. These inversions are dependent on the probe postion within the flow field in relation to the gradient-probe position and are also dependent on the probe type. Measurements with a gradient probe with high spatial resolution show the presence of streamwise vortices parallel to the wall. These streamwise vortices are found to precede sweeps. Author (ESA)

N83-16704# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
EXPERIMENTAL INVESTIGATION OF AEROSOL JETS FROM MICRONOZZLES [EXPERIMENTELLE UNTERSUCHUNGEN AN AEROSOLSTRAHLEN AUS MIKRODUESEN]
Joachim Haegele 1981 86 p refs In GERMAN; ENGLISH summary
(MPIS-Mitt-72; ISSN-0374-1257) Avail: NTIS HC A05/MF A01

An aerosol jet generated by the expansion of an aerosol gas suspension from different micro-nozzles was studied. The particle velocity was measured by a Fabry-Perot laser Doppler anemometer. The width and the structure of the jet was evaluated by direct optical investigation. Comparative measurements show that Laval nozzles are more suitable for the generation of rapid, intense aerosol jets than orifices, because the internal energy of the carrier-gas molecules is transformed into unidirectional kinetic energy. Separation of the gas jet in the divergent part of the Laval nozzle leads to focusing effects of the aerosol jet and thus the expansion angle remains small. The particles, which are accelerating large distances, gain high velocities. Comparison of the measured velocities with models shows relatively good agreement. Nozzles for accelerating aerosol jets are proposed.
Author (ESA)

N83-16705# Bonn Univ. (West Germany). Sonderforschungsbereiches 72.
NONSTATIONARY VISCOUS FLUID FLOW GENERATED BY SURFACE TENSION. PART 1: EXISTENCE OF CLASSICAL SOLUTIONS
J. Bemelmans May 1982 57 p refs Submitted for publication Sponsored by Max Kade Research Grant
(Preprint-509) Avail: NTIS HC A04/MF A01

The existence of classical solutions to the free boundary problem for the nonstationary Navier-Stokes equations of a drop of fluid which is either in vacuum or immersed in another viscous fluid is proved. The boundary of the drop is determined by surface tension, which causes the two fluids and the free surface separating them to move. The existence proof can also be applied if exterior forces act on the fluid. Author (ESA)

N83-16706# Harmon Engineering and Testing, Inc., Auburn, Ala.
TECHNIQUES TO MEASURE VOLUMETRIC FLOW AND PARTICULATE CONCENTRATION IN STACKS WITH CYCLONIC FLOW
J. Douglas Sterrett, Allen R. Barbin, Joe W. Reece, W. Glenn Carter, and Bruce B. Ferguson Aug. 1982 88 p refs Submitted for publication
(Contract EPA-68-02-3215)
(PB82-259789; EPA-600/4-82-062) Avail: NTIS HC A05/MF A01 CSCL 20D

It was determined that an in stack venturi can accurately measure volumetric flow in stacks with a severe cyclonic flow profile. The design requirements of the venturi are described. Also described was a low head loss, egg crate shaped device that effectively straightens cyclonic flow. Installation of such a device after a tangential inlet to a tall stack can result in considerable energy savings because it takes less fan power to push the straightened flow. Results to determine the particulate distribution downstream of the egg crate were inconclusive. GRA

N83-16707# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
EQUATIONS FOR THE FLOW OF AN INCOMPRESSIBLE, INVISCID FLUID THROUGH A COLLAPSIBLE TUBE UNDER LONGITUDINAL TENSION
J. W. Reyn 1982 31 p refs
(PB82-261017; Rept-82-19) Avail: NTIS HC A03/MF A01 CSCL 20D

Equations for the steady and unsteady flow of an incompressible, inviscid fluid through a collapsible tube under longitudinal tension are derived. The tube is treated partly as a membrane, made of an elastic material, obeying Hooke's law, and the collapsibility of the tube is taken into account in an approximate way by replacing in the equations for an axisymmetric membrane, a term representing the resistance of the tube to area change by the tube law for collapsible tubes. The flow is assumed to be uniform in a cross-section. Author (GRA)

N83-16708# Technische Hogeschool, Delft (Netherlands). Lab. of Aerodynamics and Hyrdodynamics.
A THEORETICAL MODEL FOR CORE-ANNULAR FLOW OF A VERY VISCOUS OIL CORE AND A WATER ANNULUS THROUGH A HORIZONTAL PIPE
G. Ooms, A. Segal, A. J. vanderWees, and R. V. A. Oliemans (Koninklijke/Shell Laboratorium Amsterdam) 1981 32 p ref
(PB82-261991; MEA-11) Avail: NTIS HC A03/MF A01 CSCL 13B

A theoretical model was developed for core-annular flow of a very viscous oil core and a water annulus through a horizontal pipe. Special attention was paid to understanding how the buoyancy force on the core, resulting from any density difference between oil and water is counter-balanced. This problem was simplified by assuming the oil viscosity to be so high that any flow in the core may be neglected and hence any variation with time of the oil-water interfaced form. So in the model the core is assumed to be solid and the interface to be a solid-liquid interface. Author (GRA)

N83-16709# Cape Town Univ. (South Africa). Measurement and Control Research Group.
THE MEASUREMENT OF FLOW VELOCITY DISTRIBUTION IN FLUIDS
M. S. Dann and J. R. Greene 28 May 1982 25 p refs
(PB82-257882; MINTEK-M28; ISBN-0-86999-574-X) Avail: NTIS HC A02/MF A01 CSCL 14B

A method for the ultimate improvement, in range and accuracy, of the cross-correlation flowmeter is investigated. The principles on which the flowmeter operates and fundamental digital signal-processing techniques are reviewed, and the process of the Fourier-transform deconvolution of the auto-correlation and cross-correlation functions is investigated. Simulation of the flow system on a computer is shown to require impracticable amounts of computer time to achieve the necessary convergence of the correlation funtions. Consequently, correlations and measurements of velocity profiles are made on an experimental flow rig.
Author (GRA)

N83-16710# United Technologies Corp., East Hartford, Conn.
SOLAR/GAS RANKINE/RANKINE-CYCLE HEAT PUMP ASSESSMENT Final Report, Mar. 1981 - Jul. 1982
H. Ezzat Khalifa and G. Melikian Jul. 1982 208 p refs
(Contract GRI-5080-343-0441)
(PB82-254863; UTRC-R82-955621; GRI-80/0139) Avail: NTIS HC A10/MF A01 CSCL 13A

This report contains an assessment of the technical and economic feasibility of Rankine-cycle solar-augmented gas-fired heat pumps (SAGFHP) for multi-family residential and light-commercial applications. The SAGFHP design considered in this report is based on the successful UTRC turbocompressor system which has been tested both in the laboratory and in a solar cooling installation in Phoenix, AZ. An hour-by-hour modeling of present-design SAGFHP performance in multi-family and office buildings in New York, Wisconsin, Nebraska and Oregon indicated that, even without solar augmentation, primary energy savings of up 17% and 31% could be achieved relative to advanced furnace plus electric air conditioning systems and electric heat pumps, respectively. GRA

N83-16711# Iowa Inst. of Hydraulic Research, Iowa City.
ON CYLINDRICAL SOLITARY WAVES
Henry Power Meneses and Allen T. Chwang Aug. 1982 90 p refs
(Grant NSF ENF-79-10049)
(PB82-253733; IIHR-247) Avail: NTIS HC A05/MF A01 CSCL 20D

The propagation and focusing of a cylindrical solitary wave in waters of constant depth were investigated analytically. In order

to accomplish this, an inner-outer expansion technique was applied to the cylindrical Boussinesq equations. The results are in good agreement with the numerical solutions found in the literature. The behavior of the cylindrical solitary wave in the outer region is investigated by obtaining an approximate solution of the corresponding cylindrical Korteweg-deVries equation. GRA

N83-17381*# Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.
THERMAL RADIATION VIEW FACTOR: METHODS, ACCURACY AND COMPUTER-AIDED PROCEDURES
Prasanna V. Kadaba *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 58 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20D

N83-17395*# Alabama Univ., Huntsville. Dept. of Physics.
EXPERIMENTAL STUDY OF TIME-DEPENDENT FLOWS IN LABORATORY ATMOSPHERIC FLOW MODELS
J. E. Rush *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 22 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20D

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N83-16712# Electricity Council, London (England). Overseas Relations Branch.
A GAMMA-RAY DEVICE FOR NON-CONTACT MEASUREMENT OF TEMPERATURES OF SOLIDS
T. Yoshioka Nov. 1982 5 p Transl. into ENGLISH from Japanese Patent no. 3887/42 (19 Jun. 1967) 5 p
(BLL-OA-Trans-1841-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

A gamma ray thermometer is described which consists of a gamma ray source of energy suitable for irradiating a solid, a Mossbauer absorber inserted into the path of gamma rays reflected by the solid, and a counter for determining the number of gamma rays which passed through the absorber. The noncontact measurement of the temperature of the solid is achieved by utilizing the temperature dependence of the probability of recoiless emission of scattered gamma rays resulting from temperature variation of the solid. A.R.H.

N83-16713 British Broadcasting Corp., Kingswood (England). Engineering Div.
SURFACE-ACOUSTIC-WAVE TRANSVERSAL FILTERS FOR PULSE SHAPING IN DIGITAL MAGNETIC RECORDING
K. Hacking Aug. 1982 15 p refs
(BBC-RD-1982/14) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

Several aspects of surface-acoustic-wave (SAW) transveral filters are discussed in the context of their possible application to signal equalisation in digital magnetic recording. The theoretical background to a pulse analysis and synthesis procedure is outlined, together with the principal features of a computer program for SAW filter design. The measured characteristics of some experimental filters support the general feasibility of the approach and reveal one of the design problems. Author

N83-16714# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
TECHNIQUE FOR CALIBRATING A MEASURING ARRANGEMENT TO DETERMINE THE OXYGEN PARTIAL PRESSURE IN THE AMBIENT FIELD OF A SENSOR
Joachim Hopmeier, Helmut Leist, and Georg J. Ullrich 1983 9 p Transl. into ENGLISH from German patent no. 80108028.4
(NRC/CNR-TT-2042; ISSN-0077-5606) Avail: NTIS HC A02/MF A01

A technique for calibrating a measuring arrangement for determining the oxygen partial pressure occurring in the ambient field of a sensor is described. The sensor is first brought in contact with a null calibration solution in which the partial pressure of the oxygen is held at null by means of substance (bonding agent) that is capable of chemically bonding oxygen, and in which the device is then started up and adjusted in such a way that it also shows the null value of the oxygen partial pressure. S.L.

N83-16715*# Illinois Univ., Urbana. Aeronomy Lab.
A ROCKET-BORNE ELECTRIC FIELD METER FOR THE MIDDLE ATMOSPHERE
G. J. Dettro and L. G. Smith 1 Dec. 1982 114 p refs
(Grant NGR-14-005-181)
(NASA-CR-169791; NAS 1.26:169791; UILU-ENG-82-2505; AERONOMY-105; ISSN-0568-0581) Avail: NTIS HC A06/MF A01 CSCL 14B

The design and construction of a rocket-borne electric field meter for determining the atmosphere's electric field and the conductivity in the middle atmosphere are considered. The operating characteristics of the instrument are discussed and a proposed flight configuration is given. The testing of the prototype is described and suggestions are advanced for further improvements. A.R.H.

N83-16716*# Aerojet Electrosystems Co., Azusa, Calif.
Si:Bi SWITCHED PHOTOCONDUCTTOR INFRARED DETECTOR ARRAY Final Technical Report
C. E. Eakin Jan. 1983 23 p
(Contract NAS2-11248)
(NASA-CR-166439; NAS 1.26:166439; AEC-6372) Avail: NTIS HC A02/MF A01 CSCL 14A

A multiplexed infrared detector array is described. The small demonstration prototype consisted of two cryogenically cooled, bismuth doped silicon, extrinsic photoconductor pixels multiplexed onto a single output channel using an on focal plane switch integration sampling technique. Noise levels of the order of 400 to 600 rms electrons per sample were demonstrated for this chip and wire hybrid version. S.L.

N83-16717# Atmospheric Science Associates, Bedford, Mass.
TECHNICAL STUDIES IN SUPPORT OF THE DESIGN OF A CLOUD WATER CONTENT METER AND HYDROMETER SPECTROMETER Final Report, 12 Jun. 1981 - 11 Jun. 1982
Hillyer G. Norment Hanscom AFB, Mass. AFGL 10 Jul. 1982 85 p refs
(Contract F19628-81-C-0124; AF Proj. 6670)
(AD-A120388; AFGL-TR-82-0188) Avail: NTIS HC A05/MF A01 CSCL 07/4

Theoretical, computational and literature survey studies in support of the design of novel airborne cloud water content and hydrometeor spectrometer instruments are reported. Measurements depend on momentum effects of impacted hydrometeors that are retained temporarily on flat, annular, rotating surfaces mounted normal to the airplane flight path. The studies are of three types: calculation of flow fields and water drop trajectories; analyses of dynamic pressure distributions across, and total torque on, the vanes which rotate the annuli; and hydrometeor impact effects.
Author (GRA)

N83-16718# Hughes Aircraft Co., Culver City, Calif.
HOLOGRAPHIC ALIGNMENT BREADBOARD Final Technical Report, 7 Aug. 1979 - 30 Jun. 1981
D. L. Sullivan Griffiss AFB, N.Y. RADC May 1982 134 p
(Contract F30602-79-C-0228; ARPA Order 3503; AF Proj. C503)
(AD-A120527; HAC-FR81-72-1029; RADC-TR-82-130) Avail: NTIS HC A07/MF A01 CSCL 20/6

Previous studies have shown the utility of a nonlinear grating on the primary mirror of a laser beam pointing system. The nonlinear grating can focus a full aperture sample of the laser beam or an alignment beam to a conveniently located alignment sensor, where it is used for wavefront error diagnostic and control purposes. The Holographic Alignment Breadboard (HOLAB) program designed, fabricated, and tested the holographic grating laser beam sampler alignment technique just described. A breadboard system was built which incorporated an ox-axis primary mirror with a 30 centimeter diameter and an F-number of F/1.5. Tests were conducted with the breadboard to establish the operational properties of this technique. The experimental data correlated well with analytical predictions. Author (GRA)

N83-16719# Los Alamos Scientific Lab., N. Mex.
WIDE-RANGE TRITIUM MONITOR
D. F. Anderson and R. D. Hiebert 1981 4 p refs Presented at IEEE Symp. on Nucl. Sci., San Francisco, 21-23 Oct. 1981
(Contract W-7405-eng-36)
(DE82-003262; LA-UR-81-2987; CONF-811012-21) Avail: NTIS HC A02/MF A01

An ionization chamber consisting of two active volumes in a single enclosure and an auto range changing electrometer covering a dynamic range of 10 to the 8th power are discussed. The tritium monitor is designed to have a reduced sensitivity to tritium contamination, to have a fast response, and to be useful for tritium concentrations of a few micro-Ci/cu m to 10 to the 8th power micro-Ci/cu m. DOE

N83-16720# Los Alamos Scientific Lab., N. Mex.
DESIGN OPTIMIZATION OF LIQUID SCINTILLATOR COSMIC-RAY VETO DETECTOR WITH BBQ SHIFTER
H. W. Kruse, S. S. Egdorf, and D. F. Simmons Oct. 1981 4 p refs Presented at IEEE Symp. on Nucl. Sci., San Fransico, 21-23 Oct. 1981
(Contract W-7405-eng-36)
(DE82-002379; LA-UR-81-3116; CONF-811012-18) Avail: NTIS HC A02/MF A01

Certain design characteristics of a liquid scintillator detector for charged cosmic particles, were studied. These included evaluation of scintillator emission spectra, absorption in various thickness of BBO shifter bars, and effective transmission in long lengths of BBQ acrylic. For the BBQ sample, 12.5 mm thick with semicircular shape, the shifted light was transmitted with 2.0 m absorption length. DOE

N83-16721# California Univ., Livermore. Lawrence Livermore Lab.
THE LIVERMORE FLOW CYTOMETER
Donald C. Peters, Phillip N. Dean, and Daniel Pinkel 19 Nov. 1981 12 p
(Contract W-7405-eng-48)
(DE82-005459; UCID-19260) Avail: NTIS HC A02/MF A01

A stable, easy to operate, flow cytometer was built for routine use by research personnel in a biology laboratory. A 5 watt argon ion laser excites the fluorescent dyes in cells flowing through a quartz flow chamber. A f/0.95 TV camera lens collects the fluorescent and scattered light and directs it through color separation filters and a beam splitter onto two photomultiplier tubes. Two 3 axis positioners are used to align the focused laser beam and the flow chamber with the light collection optics. All of the components, except the laser, are mounted on a riged aluminum plate. Standard electronics modules are used. A coefficient of variation of about 1% can be obtained with fluorescent microspheres. DOE

N83-16722# California Univ., Berkeley. Lawrence Berkeley Lab.
A MULTI-ELEMENT SILICON DETECTOR FOR X-RAY FLUX MEASUREMENTS
A. C. Thompson, F. S. Goulding, H. A. Sommer, J. T. Walton, E. B. Hughes (Stanford Univ.), J. Rolfe (Stanford Univ.), and H. D. Zeman (Stanford Univ.) Oct. 1981 6 p refs Presented at the IEEE Nucl. Sci. Symp., San Francisco, 21-23 Oct. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE82-004841; LBL-12746; CONF-811012-39) Avail: NTIS HC A02/MF A01

A 30 element Si(Li) detector was fabricated to measure the one dimensional flux profile of 33 keV X-rays from a synchrotron radiation beam. The device, which is fabricated from a single 39 mm x 15 mm silicon wafer, is a linear array of 0.9 mm x 7 mm elements with a 1 mm center to center spacing. It is 5 mm thick and when operated at room temperature has an average leakage current of 10 nA/element. The X-ray flux in each element is determined by measuring the current with a high quality operational amplifier followed by a current digitizer. This detector is being used to study the use of synchrotron radiation for non-invasive imaging of coronary arteries. The experiment uses the differences in the transmitted flux of a monochromatized X-ray beam above and below the iodine K-edge. Measurements were made on plastic phantoms and on excised animal hearts with iodinated arteries. DOE

N83-16723# California Univ., Livermore. Lawrence Livermore Lab.
ACOUSTIC MICROSCOPE FOR SURFACE CHARACTERIZATION
Bruce W. Maxfield and Rolf D. Weglein (Hughes Missiles Systems Group, Canoga Park, Calif.) 1981 6 p refs Presented at the 1981 Ultrasonic Symp., Chicago, 13 Oct. 1981
(Contract W-7405-eng-48)
(DE82-001128; CONF-811092-1; UCRL-86767) Avail: NTIS HC A02/MF A01

The use of acoustic microscopy for nondestructive thickness measurements of surface layers is discussed. The approach is based upon the thickness dependence of the surface wave velocity in a layered medium. Using an acoustic material signature from a focused beam microscopy, one can determine the surface-wave velocity. This technique also has the potential of providing information on coating defects and surface adhesion. An experimental facility is being established for the characterization of the relatively thick coatings that are protecting surfaces from corrosion and erosion. Thickness in the range of 0.01 to 0.25-mm require an operating frequency between 5 and 200-MHz. An experimental system capable of operation at discrete frequencies between these limits was constructed and initially used to obtain the acoustic material signature of aluminum on beryllium from which the surface wave velocity is deduced. This measured velocity compares favorably with calculated results. DOE

N83-16724# California Univ., Livermore. Lawrence Livermore Lab.
MEASUREMENT SYSTEM SUPPORT AT THE JAERI-CRT FACILITY: PRESSURE TRANSDUCERS
W. M. Shay, Jr. and E. W. McCauley Nov. 1981 36 p
(Contract W-7405-eng-48)
(DE82-004742; UCID-19112) Avail: NTIS HC A03/MF A01

As part of a continuing liaison between the US NRC and foreign full scale containment research programs, measurements assistance in the form of the loan of 30 flush diaphram pressure transducers has been provided to the JAERI-CRT MK II research program at Tokai-Mura, Japan. Procedures developed earlier at the Lawrence Livermore National Laboratory (LLNL) under similar research work sponsored by the US NRC were used by LLNL to successfully complete final installation and in-situ end-to-end calibration of the transducers in the CRT facility. The results from this calibration showed a very close agreement between sensitivities and linearities calculated at LLNL and the ones calculated at JAERI and indicate the transducers should give valid data during future testing. DOE

N83-16725# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.
ANALOG-SIGNAL PROCESSING FOR THE TIME PROJECTION CHAMBER
R. C. Jared, D. A. Landis, and F. S. Goulding Oct. 1981 6 p

refs Presented at the IEEE Nucl. Sci. Symp., San Francisco, 21-23 Oct. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE82-004562; LBL-13183; CONF-811012-38) Avail: NTIS HC A02/MF A01

The time projection chamber (TPC) is a large gas filled cylindrical detector designed to provide 3-D images of tracks radiating from the center of the detector where e(+)e(-) collisions occur. Ionization along the tracks is drifted in an electric field to the end planes which are equipped with a large array of proportional wires and position pads (17,000 channels). The wire signals are used to derive radial data while the pad signals provide the azmuthal information. The axial dimension is determined using the drift time of the ionization. Preamplifiers mounted in the ends of the chamber feed the signals to remote amplifiers whose outputs drive charge coupled devices (CCD). The CCDs are normally clocked at 10 MHz and hold a 45.5 micron history of analog drift information from the TPC. During readout the clock is changed to 20 KHz and 17,000 CCD outputs are digitized (9 bits) in parallel. The nonzero data is then transferred to buffer memories associated with the digitizers. The analog signal processing part of the system is emphasized. DOE

N83-16726# Pacific Northwest Lab., Richland, Wash.
BETA-GATED GAMMA COINCIDENCE COUNTING WITH A PHOSWICH DETECTOR
J. H. Kaye and R. A. Warner 1981 17 p refs Presented at the IEEE Symp. on Nucl. Sci., San Francisco, 21 Oct. 1981
(Contract DE-AC06-76RL-01830)
(DE82-003832; PNL-SA-9159; CONF-811012-36) Avail: NTIS HC A02/MF A01

A special type of phoswich detector system was evaluated for measurement of radionuclides which decay with emission of time coincident beta and gamma radiation. Background reductions of more than two orders of magnitude were obtained for the energy region from 500 to 950 keV. Both NE 102 plastic scintillators and anthracene were evaluated. Advantages and disadvantages of the method are discussed. DOE

N83-16727# Brookhaven National Lab., Upton, N. Y.
A DATA ACQUISITION AND EXPERIMENT CONTROL SYSTEM FOR HIGH-DATA-RATE EXPERIMENTS AT THE NATIONAL SYNCHROTRON LIGHT SOURCE
J. L. Alberi and F. W. Stubblefield Nov. 1981 9 p refs Presented at the IEEE Symp. on Nucl. Sci., San Francisco, 21-23 Oct. 1981
(Contract DE-AC02-76CH-00016)
(DE82-005236; BNL-30337; CONF-811012-47) Avail: NTIS HC A02/MF A01

A data acquisition and experiment control system for experiments at the Biology Small-Angle X-ray Scattering Station at the National Synchrotron Light Source has been developed based on a multiprocessor, functionally distributed architecture. The system controls an X-ray monochromator and spectrometer and acquires data from any one of three position-sensitive X-ray detectors. The average data rate from the position-sensitive detector is approx. 1 million events/sec. Data is stored in a one megaword histogramming memory. The experiments at this Station require that X-ray diffraction patterns be correlated with timed stimuli at the sample. Therefore, depending on which detector is in use, up to 1,000 time-correlated diffraction patterns may be held in the system memory simultaneously. The operation of the system is functionally distributed over four processors communicating via a multiport memory. DOE

N83-16728# Atomic Energy Research Establishment, Harwell (England). Nuclear Physics Div.
MOESSBAUER SPECTROMETER FOR DIFFICULT ISOTOPES
T. E. Cranshaw Jun. 1981 11 p refs
(DE82-700191; AERE-R-10206) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

The parameters of some Moessbauer isotopes present experimental difficulties either because high velocities, low frequencies, low temperatures, or any combination of these conditions, are needed. A simple approach to easing these difficulties is described, using a mechanical resonant system and a phase locked loop. DOE

N83-16729# Atomic Energy Research Establishment, Harwell (England). Instrumentation and Applied Physics Div.
DESIGN PRINCIPLES FOR RADIOLOGICAL PROTECTION INSTRUMENTATION SYSTEMS
F. H. Wells and R. G. Powell Feb. 1981 118 p
(DE82-700407; AECP-8-Pt-2) Avail: NTIS (US Sales Only) HC A06/MF A01; DOE Depository Libraries

This Code of Practice takes the form of recommendations intended for designers and installers of Radiological Protection Instrumentation, and should also be of value to the newcomer to the R.P.I. field. Topics are discussed under the following headings: outline of R.P.I. requirements, specifying the requirement, satisfying the requirements, (overall design, availability and reliability, information display, human factors, power supplies, manufacture, quality assurance, testing, and cost analysis), supply, location and operation of the equipment, importance of documentation. DOE

N83-16730# California Univ., Livermore. Lawrence Livermore Lab.
IMAGE CONVERTER CAMERA SYSTEM FEATURES AND APPLICATION TO E.B.W.
L. L. Steinmetz, K. A. Mikkelson, W. R. Rapoport, L. L. Shaw, L. G. Seppala, J. B. Sonderman, R. A. Anderson, R. L. Bray, A. P. Lee, R. D. Rodenhizer et al Dec. 1981 11 p refs Presented at the 6th Ann. Firing Systems Conf., Los Alamos, N. Mex., 17-18 Nov. 1981
(Contract W-7405-eng-48)
(DE82-007575; UCRL-86651; CONF-811176-1) Avail: NTIS HC A02/MF A01

A large format, multiframe gated image converter camera system has been developed to obtain stop action film records of high velocity objects. As originally conceived, the camera system would be used with a multipulse laser illumination system. However, self luminous events such as exploding bridge wires can be successfully recorded with the camera system. DOE

N83-16731# California Univ., Livermore. Lawrence Livermore Lab.
ACCURACY OF REACTION RATES INFERRED FROM LAGRANGE ANALYSIS AND IN-SITU GAUGE MEASUREMENTS
H. C. Vantine, R. B. Rainsberger, W. D. Curtis (Kansas State Univ.), R. S. Lee (Kansas State Univ.), M. Cowperthwaite (Stanford Research Inst., Menlo Park, Calif.), and J. T. Rosenberg (Stanford Research Inst., Menlo Park, Calif.) 1981 12 p refs Presented at 7th Symp. on Detonation, Annapolis, 16-19 Jun. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE82-005834; UCRL-85798; CONF-810602-35) Avail: NTIS HC A02/MF A01

A reactive-flow-Lagrange-analysis (RFLA) technique for analyzing data from embedded velocity and stress gauges is formulated. The reliability is tested by analyzing records obtained from a similarity solution to the 1-D hydrodynamic equations. The accuracy of the RFLA using perfect gauge records and its sensitivity to gauge placement and to errors in the gauge records are discussed. DOE

N83-16732# Sandia Labs., Albuquerque, N. Mex.
INSTRUMENTATION AND METHODS FOR SCANNING AUGER MICROSCOPY
M. B. Chamberlain 1982 36 p refs Presented at the Scanning Electron Microscopy Ann. Meeting, Anaheim, Calif., Apr. 1982
(Contract DE-AC04-76DP-00789)
(DE82-011023; SAND-81-2452C; CONF-8204093) Avail: NTIS HC A03/MF A01

Advances in the instrumentation for scanning Auger microscopy are discussed. Several state-of-the-art Auger microprobes employ electron beams with diameters as small as 50 nm. Specimen

damage produced by electron beams and analytical methods for limiting such damage to an acceptable level are discussed. The instrumentation of the ultrahigh vacuum hardware; the electron optics of the gun, optical column and spectrometer; and the hardware of possible future improvements in electron microscopy are reviewed. Finally, the use of computers to log, analyze, and store data is discussed. DOE

N83-16733# Oak Ridge National Lab., Tenn.
HIGH-TEMPERATURE CARBON-FURNACE THERMOMETER
D. D. Smith 1982 10 p refs Presented at the 6th Symp. on Temperature, Washington, D.C., 14-18 Mar. 1982
(Contract W-7405-eng-26)
(DE82-001862; Y/DW-259) Avail: NTIS HC A02/MF A01

A thermometer for monitoring temperatures between 1500 and 2600 K in industrial carbon furnaces is described. The instrument uses a calibrated broadband radiation sensor and incorporates features to minimize optical path attenuations which limit temperature measurement accuracy in practice. Errors can be substantially reduced to near instrument calibration uncertainty (+.1%) with an enclosed windowless optical path to a blackbody target. DOE

N83-16734# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
OPERATION OF INERT-ATMOSPHERE GLOVE BOX
Felix Schwager Dec. 1981 11 p
(Contract W-7405-eng-48)
(DE82-011101; LBL-13774) Avail: NTIS HC A02/MF A01

A sort manual is provided for the operation of the inert-atmosphere glove box (vacuum atmosphere DLX-001-S-G) equipped with water, oxygen, and nitrogen removal and analysis systems. DOE

N83-16735# Intermountain Forest and Range Experiment Station, Ogden, Utah.
A CALIBRATION MODEL FOR SCREEN-CAGED PELTIER THERMOCOUPLE PSYCHROMETERS
Ray W. Brown and Dale L. Bartos Jul. 1982 159 p
(PB82-262254; FSRP-INT-293) Avail: NTIS HC A08/MF A01 CSCL 14B

A calibration model for screen-caged Peltier thermocouple psychrometers was developed that applies to a water potential range of 0 to 80 bars, over a temperature range of 0 to 40 C, and for cooling times of 15 to 60 seconds. In addition, the model corrects for the effects of temperature gradients over zero-offsets from -60 to +60 microvolts. Complete details of model development are discussed, together with the theory of thermocouple psychrometers, and techniques of calibration and cleaning. Also, information for computer programing and tabular summaries of model characteristics are provided. GRA

N83-16736# National Bureau of Standards, Boulder, Colo.
AN ACCURACY STATEMENT FOR A FACILITY USED TO CALIBRATE STATIC PRESSURE TRANSDUCERS AND DIFFERENTIAL PRESSURE TRANSDUCERS AT HIGH BASE PRESSURE
C. F. Sindt and J. F. LaBrecque Jun. 1982 45 p Sponsored in part by the American Gas Association and the Gas Research Inst.
(PB82-263625; NBS-TN-1052) Avail: NTIS HC A03/MF A01 CSCL 14B

A facility was developed to calibrate pressure transducers that are used in a gas mass flow facility. Both static and differential pressure transducers can be calibrated. An air dead weight tester is the standard for static transducers in the range from 3.8 to 4.5 MPa. An air dead weight tester is also the standard for the differential pressure transducers in the range of 2.5 kPa to 50 MPa; a cistern manometer. This, plus the uncertainties in the high pressure corrections to the cistern manometer and measurement of the mercury temperature, contributes plus or minus 690 ppm to the uncertainty of the differential pressure transducer calibrations. Author (GRA)

N83-16737# Bureau of Mines, Avondale, Md.
APPLICATION OF A PHOTODIODE ARRAY OPTICAL SPECTROMETER TO THE STUDY OF THE INCENDIVITY OF LIGHT ALLOYS IMPACTING ON RUSTED STEEL, REPORT OF INVESTIGATIONS 1982
T. J. Driscoll, D. R. Flinn, and W. C. Lederer 1982 22 p refs
(PB82-257163; BM-RI-8684) Avail: NTIS HC A02/MF A01 CSCL 08I

Methane air mixtures can ignite as a result of sparking or rubbing of materials, particularly by impact involving light alloys and rusted steel where an exothermic thermite reaction can occur. The published literature is reviewed and a new method utilized by the Bureau of Mines for studying the processes occurring during collisions of light metals with rusted steels is described. The method involves measuring the spectra of sparks and explosions in methane air mixtures using a photodiode array. Initial results obtained using magnesium and aluminum alloy 6061-T651 projectiles striking rusted steel are reported. GRA

N83-16366# Joint Publications Research Service, Arlington, Va.
EXCHANGE OF HOLOGRAPHIC INFORMATION BETWEEN SALYUT-6 SPACE STATION AND FLIGHT CONTROL CENTER
Zh. Gurragcha, S. B. Gurevich, V. A. Dzhanibekov, B. Ye. Kashonov, V. V. Kovalenok, V. B. Konstantinov, M. Kordero, S. Mesa, A. V. Militsin, R. Oms et al *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 76-86 refs Transl. into ENGLISH from Tekhn. Kino i Televideniya (Moscow), no. 2, Feb. 1982 p 5-11
(For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08

N83-17362*# Tennessee Technological Univ., Cookeville. Dept. of Chemistry.
DEVELOPMENT OF TEST METHODOLOGY FOR DYNAMIC MECHANICAL ANALYSIS INSTRUMENTATION
Vernon R. Allen *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 24 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.

N83-16738*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIRECT NUCLEAR-POWERED LASERS
N. W. Jalufka Jan. 1983 53 p refs
(NASA-TP-2091; L-15168; NAS 1.60:2091) Avail: NTIS HC A04/MF A01 CSCL 20E

The development of direct nuclear pumped lasers is reviewed. Theoretical and experimental investigations of various methods of converting the energy of nuclear fission fragments to laser power are summarized. The development of direct nuclear pumped lasers was achieved. The basic processes involved in the production of a plasma by nuclear radiation were studied. Significant progress was accomplished in this area and a large amount of basic data on plasma formation and atomic and molecular processes leading to population inversions is available. S.L.

N83-16739# California Univ., Los Angeles. Dept. of Electrical Engineering.
COMPACT MILLIMETER WAVE CYCLOTRON RESONANCE MASER Progress Report, 15 Jun. 1981 - 15 Jun. 1982
N. C. Luhmann, Jr., D. B. McDermott, and W. A. Peebles Aug. 1982 42 p refs
(Grant AF-AFOSR-0200-81; AF Proj. 2301)
(AD-A120318; ENG-82-65; AFOSR-82-0866TR) Avail: NTIS HC A03/MF A01 CSCL 20/14

The building of the gyrotron chamber and associated apparatus is described. The system is operational and measurements have begun. Using only 50 kW of the 200 kW available from the X-band magnetron, the RF accelerator produced 100 mA, 100-250 keV

beams. Millimeter wave measurements were made. The second gyrotron cavity, which was designed to be excited by approximately 150 keV beams, yielded approximately 100 W at 26-46 GHz, which corresponds to 1% electron to output wave energy conversion efficiency. This cavity was designed to be undercoupled due to start oscillation considerations. The efficiency of electron energy into cavity wave power was on order of 5%. The next cavity tested is critically coupled for higher power operation. Activities include a theoretical description of the large orbit cyclotron harmonic maser which yields encouraging values for device efficiency. Efficiencies as high as 8% are predicted at millimeter wavelength operation with a uniform magnetic field. A small signal theory of the harmonic gyrotron is developed which yields the value of beam current necessary for oscillation. GRA

N83-16740# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EXPERIMENTAL INVESTIGATION OF THE DESTRUCTION OF ThF4 PROTECTIVE FILM BY A PULSED CO2 LASER

Fang Huiying, Wang Cunkui, and Fu Yushou 10 Sep. 1982 7 p Transl. into ENGLISH from Lixue yu Shijian (China), v. 3, no. 4, 1981 p 57-59

(AD-A119831; FTD-IS(RS)T-0979-82) Avail: NTIS HC A02/MF A01 CSCL 20/5

The laser-damage prevention ability of glass-based and copper-based gold film reflectors after being plated with the ThF4 protective film are investigated. Samples are irradiated with a CO2 pulse laser of wave length of 10.6 micron (pulse width is 0.6 microsecond) at 4 different energy densities. The damages are observed and analysed microscopically. GRA

N83-16741# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

NEW LASER PROTECTIVE GOGGLES

Liping Yao and Yifau Zhang 19 Aug. 1982 6 p Transl. into ENGLISH from Jiguang (China), v. 8, no. 6, Jun. 1981 p 63

(AD-A120580; FTD-ID(RS)T-0384-82) Avail: NTIS HC A02/MF A01 CSCL 06/17

Iron doped high silica glass filters out infrared and ultraviolet light and maintains clear visibility. This is the type of eyeglass material which is introduced. The high silica glass containing Fe(2+) and Fe(3+) iron is a high silica porous glass which is made using sodium borosilicate glass which goes through a heat treatment phase, acid treatment, and leaching. Then the porous glass is dipped in a ferroaluminum ion solution and coil formed reduced conditions into high silica glass containing Fe(2+) and Fe(3+). This type of glass has special characteristics with respect to infrared and ultraviolet light absorption, i.e., transmission is 5% at 1.1 microns, but visible light range transmission is approximately 80%, and at wavelengths less than 0.33 micron all is blocked out (for specimens containing 0.76% iron and having a thickness of 4.5mm). GRA

N83-16742# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A CO2 GAS DYNAMIC LASER WITH FLOW RATE OF 10 Kg/SEC

Chen Haitao 23 Aug. 1982 15 p Transl. into ENGLISH from Lixue yu Shijian (China), v. 4, no. 1, 1982 p 50-53

(AD-A120592; FTD-ID(RS)T-0956-82) Avail: NTIS HC A02/MF A01 CSCL 20/5

Using a supersonic technique in a 10 Kg/sec flow rate carbon dioxide gas dynamic laser unit to create a population inversion of the carbon dioxide particles, a 33,000 watt multiple mode continuous output was obtained. The power ratio reached 3000 watt sec/Kg. Single mode output was the P(20) branch with power of 11,200 watts and a beam diffuse angle of 4 seconds of radian. After eliminating the effect of stock wave, the diffuse angle can be reduced to 3 seconds of a radian. The results were below standards compared to those in foreign countries. L.F.M.

N83-16743# Stanford Univ., Calif. Lab. of Physics.

ACOUSTICAL SCANNING OF OPTICAL IMAGES Semiannual Technical Report, 1 Jan. - 30 Jun. 1982

G. S. Kino, R. Thornton, and J. B. Green Aug. 1982 31 p refs (Contract N00014-76-C-0129; DARPA Order 2778; AF Proj. 8D10) (AD-A120481; GL-3478; SATR-14) Avail: NTIS HC A03/MF A01 CSCL 20/5

The fiber optic laser probe was used as a diagnostic tool to identify loss mechanisms in monolithic storage correlators, generating suggestions for improved device efficiency. Schottky diode correlators were operated in the input correlation mode, demonstrating that it is possible to charge Schottky diodes slowly as p-n diodes with proper voltage amplitudes. Schottky diode correlator theory is modified to account for charge leakage effects and are compared with experimental results. A new signal processing device, the SAW/FET, is introduced which interfaces high speed analog signs with low speed digital ones. Experimental results are presented. GRA

N83-16744# California Univ., Berkeley. Dept. of Chemistry.

CROSSED MOLECULAR BEAM STUDY OF THE REACTIONS OF OXYGEN AND FLUORINE ATOMS Annual Report, 1 Apr. 1981 - 30 Aug. 1982

Yuan T. Lee 21 Sep. 1982 62 p refs

(Contract N00014-75-C-0671)

(AD-A120531) Avail: NTIS HC A04/MF A01 CSCL 20/5

Using the method of photofragmentation translational spectroscopy, photodissociation of ethyl-vinyl ether, diethyl ether, nitromethane, nitroethane, and cycloheptatriene have been investigated. For concerted reactions involving the formation of a cyclic transition state, a large fraction of the exit potential energy barriers appear as translational. Author (GRA)

N83-16745# Brookhaven National Lab., Upton, N. Y.

STUDIES ON THE UNDULATOR FOR THE FREE ELECTRON LASER EXPERIMENT AT THE NATIONAL SYNCHROTRON LIGHT SOURCE

A. Luccio and S. Krinsky 1981 54 p refs Presented at 1981 Workshop on Free Electron Lasers, Sun Valley, Idaho, 21-25 Jun. 1981 Submitted for publication

(DE82-001810; BNL-30078; CONF-8106145-4) Avail: NTIS HC A04/MF A01

Undulator magnets are used in connection with particle (typically electron) storage rings to enhance the spectrum of synchrotron radiation and are a basic component of free electron lasers. Two configurations are common: helical undulators, for which the magnetic field on the axis is constant in modulus and rotates around the axis it proceeds along, and transverse undulators, that have a median plane of symmetry. The orientation of the field for a transverse geometry is always the same on the median plane, but the modulus of the field is spatially modulated. For the electron storage rings studied, undulators were proposed to produce a line spectrum of spontaneous radiation to be used in the experiments. One of these undulators is used for the free electron laser experiment on the VUV ring. The basic design of this undulator and its expected performance are discussed. Author

N83-16746# California Univ., Livermore. Lawrence Livermore Lab.

ULTRAHIGH PRESSURE LASER-DRIVEN SHOCK WAVE EXPERIMENTS

R. J. Trainor, N. C. Holmes, and R. A. Anderson 1981 8 p refs Presented at the APS Conf. on Shock Waves in Condensed Matter, Menlo Park, Calif. 22-24 Jun. 1981

(Contract W-7405-eng-48)

(DE82-004382; UCRL-86697; CONF-810684-53) Avail: NTIS HC A02/MF A01

We review recent laser-driven shock wave experiments, with a view toward assessing the prospects of making accurate physical properties measurements at ultrahigh pressures. Recent experimental results on the scaling of shock pressure with laser intensity and wavelength are presented, and preliminary impedance matching experiments are discussed. DOE

N83-16747# Sandia Labs., Albuquerque, N. Mex.
DIVACANCY ANNEALING IN CRYSTALLINE SILICON USING E-BEAM AND PULSED RUBY LASER EXCITATION
H. J. Stein, J. A. Knapp, and P. S. Peercy 1981 12 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16 Nov. 1981
(Contract DE-AC04-76DP-00789)
(DE82-003340; SAND-81-2523C; CONF-811122-16) Avail: NTIS HC A02/MF A01

Annealing of divacancies which were produced by 11B ion implantation was investigated under furnace, pulsed e-beam and pulsed ruby laser exposures. Despite orders of magnitude shorter exposure times for annealing and the concomitant expected high levels of electronic excitation and layer stress, we find that the thermal annealing mechanism observed for furnace annealing is an adequate description for divacancy annealing under e-beam exposure. The observed need for melting to remove divacancies by Q-switched laser annealing is also consistent with predictions based upon extrapolation from furnace annealing. DOE

N83-16748# Oak Ridge National Lab., Tenn. Solid State Div.
TIME RESOLVED TRANSMISSION AND REFLECTIVITY OF PULSED RUBY LASER IRRADIATED SILICON
Douglas H. Lowndes, G. E. Jellison, Jr., and R. F. Wood Nov. 1981 7 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16-19 Nov. 1981 Submitted for publication
(Contract W-7405-eng-26)
(DE82-003989; CONF-811122-34-DRAFT) Avail: NTIS HC A02/MF A01

The time resolved optical transmission, T (at lambda = 1152 nm), and reflectivity, R (at 633 nm and 1152 nm), were measured for n-type single crystalline silicon (C-Si) during and immediately after pulsed ruby laser irradiation (lambda = 693 nm, FWHM pulse duration 14 nsec), for a range of pulsed laser energy densities, E sub 1. The T is found to go to zero, and to remain at zero, for a period of time that increases with increasing E sub 1, in apparent disagreement with earlier measurements elsewhere that used semiinsulating Si and a different pulsed laser wavelength. Measured reflectivities during the high R phase agree within experimental error with reflectivities calculated from the optical constants of molten Si. Quantitative agreement is also found between both our T and R measurements and detailed time and E sub 1 dependent results of thermal melting model calculations. DOE

N83-16749# California Univ., Livermore. Lawrence Livermore Lab.
GRADED-INDEX ANTIREFLECTIVE COATINGS FOR HIGH POWER LASERS DEPOSITED BY SOL-GEL PROCESS
W. Howard Lowdermilk and Shyama P. Mukherjee (Battelle Columbus Labs., Ohio) 16 Nov. 1981 7 p refs Presented at 13th Ann. Boulder Damage Conf., Boulder, Colo., 17-18 Nov. 1981 Revised Submitted for publication
(Contract W-7405-eng-48)
(DE82-006778; UCRL-86274-Rev-1; CONF-811117-2-Rev-1) Avail: NTIS HC A02/MF A01

Gradient index alkali borosilicate antireflection films for use in laser systems were deposited by the sol-gel process. It is found that laser damage thresholds of these films, measured with 1.07 micro m, 1 ns pulses are four times greater than thresholds of widely used, multilayer, antireflection coatings. DOE

N83-16750# Los Alamos Scientific Lab., N. Mex.
FREE-ELECTRON LASER RESULTS
W. E. Stein, C. A. Brau, B. E. Newman, R. W. Warren (Westinghouse Research and Development Center), J. Winston, and L. M. Young 1981 4 p refs Presented at the Linear Accelerator Conf., Santa Fe, N. Mex., 19-21 Oct. 1981 Sponsored in part by AFOSR, DARPA and Naval Air Systems Command
(Contract W-7405-eng-36)
(DE82-006147; LA-UR-81-3782; CONF-811083-24) Avail: NTIS HC A02/MF A01

The Los Alamos free-electron laser (FEL) amplifier experiment was designed to demonstrate high efficiency for transfer of energy from an electron beam to a light beam in the magnetic field of a tapered wiggler. Initial results indicate an energy transfer consistent with theory. Distinct groups of decelerated electrons as well as accelerated electrons are clearly present in the energy spectrum of electrons emerging from the wiggler when the laser light is present. The observed energy decrease for the electrons captured in the decelerating bucket is approx. 6% and the average decrease of the entire energy distribution is approx. 2% for the conditions of these initial measurements. DOE

N83-16751# Sandia Labs., Albuquerque, N. Mex.
Nd:YAG LASER BEAM DIAGNOSTICS
L. E. Pope and T. G. McDonald 1981 12 p Presented at the Interagency Mech. Operations Group Subgroup Meeting, Livermore, Calif., 13-15 Oct. 1981
(Contract DE-AC04-76DP-00789)
(DE82-005689; SAND-81-0011C; CONF-8110110-2) Avail: NTIS HC A02/MF A01

A program to develop diagnostic techniques for pulsed Nd:YAG lasers for welding is described, and problems encountered when deviations from ideal optical collimation of a laser beam is defined, the diagnostic system is described, and the SNLA welding system is discussed. DOE

N83-16752# Research Inst. of National Defence, Linkoeping (Sweden).
FREQUENCY STABILIZATION OF CO2 WAVEGUIDE LASER
Ingemar Renhorn and Martin Tideman Apr. 1982 66 p refs In ENGLISH; SWEDISH summary
(FOA-C-30271-E1) Avail: NTIS HC A04/MF A01

A waveguide laser with an output power of 3 W and a tunability of 400 MHz was stabilized to intensity maximum using a microprocessor; a stability of the order of 5 MHz was obtained. High flexibility was built into the feedback design, enabling experimental demands to be met by software programming. Author (ESA)

N83-16753# Research Inst. of National Defence, Linkoeping (Sweden).
LASER DEPTH SOUNDING FOR LOCATING OIL BELOW WATER SURFACE: A PRELIMINARY SURVEY [DJUPSONDERANDE LASER FOER LOKALISIERUNG AV OLJA UNDER VETTENYTAN - EN FOERSTUDIE]
Ove Steinvall, Soeren Svensson, and Anders Widen Aug. 1982 29 p refs In SWEDISH
(FOA-C-30290-E1) Avail: NTIS HC A03/MF A01

A method which uses laser reflectance to locate oil slicks below the sea surface was developed. Oil can be detected down to 10 to 15 attenuation lengths (10 to 30 m in Baltic Sea water) if the turbidity is continuous and located mostly in the cross section of the laser beam. When the oil is in small disseminated volumes, its total cross section must exceed 10% of the laser beam cross section. Author (ESA)

N83-16754# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Lasertechnik.
AIRBORNE LIDAR FOR OCEANOGRAPHY AND HYDROLOGY (FLOH)
Christian Werner and Hartmut Herrmann Jun. 1982 58 p refs In GERMAN; ENGLISH summary Original will also be announced as translation (ESA-TT-799)
(DFVLR-FB-82-14) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 18,10

The development program of an airborne lidar for the parameters water depth, hydrosol distribution and temperature distribution is outlined. A lidar was proposed for two lasers (neodymium-yag and dye) taking into account the boundary conditions of the aircraft and of the air, water, and air-water interface. The expected signals are calculated using water layer models. Author (ESA)

N83-16755# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
PRIMARY PROCESSES OF ELECTRONICALLY EXCITED MOLECULES. PART 1: ENERGY TRANSFER FROM O2 (1 DELTA G)
W. Hack and O. Horie Nov. 1981 28 p refs
(MPIS-17/1981; ISSN-0436-1199) Avail: NTIS HC A03/MF A01

The formation of the electronically excited NF radicals in the reaction system F-NH3 is demonstrated. The energy transfer mechanism in NF (a sup 1 Delta) + O2 (a sup 1 Delta) yields NF (b sub 1 Sigma +) + O2(X) is examined. Addition of singlet molecular oxygen to the reacting mixture of NH3 and F atoms is found to produce the NF (b sup 1 Sigma +) radicals. These radicals are indentified by light emission at 529 and 562 nm. The energy transfer process O2 (a sup 1 Delta sub g) + NF (a sup 1 Delta) yields O2 (X sup 3 Sigma - sub g) + NF (b sup 1 Sigma +) explains the light emission. Author (ESA)

N83-17364*# Auburn Univ., Ala. Dept. of Physics and Mechanical Engineering.
PLASMA IGNITION FOR LASER PROPULSION
Raymond F. Askew *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 26 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20E

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N83-16756# Central Electricity Generating Board, London (England). Translations Section.
ARC REIGNITION IN AC TIG WELDING WITH A RECTANGULAR CURRENT PULSE (1)
S. Nobuhara et al [1982] 14 p refs Transl. into ENGLISH from Yosetsu Gakkaishi (Japan), v. 46, no.4, 1977 p 208-213
(BLL-CE-Trans-7743-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

A welding process (called AC TIG welding) often applied to aluminium and its alloys, causes problems with radio interference from superimposed high frequencies. The TIG arc stabilization for a number of base metals was investigated using a rectangular pulse voltage, viz. the minimum pulse voltage for RP half-wave reingnition (corresponding to the smallest necessary superimposed frequency voltage), reingnition energy, and arc stabilization circuit constants. S.L.

N83-16757# Electricity Council, London (England).
DIRECT COMPRESSION OF STEAM IN A SINGLE SCREW COMPRESSOR
B. Degueurce, M. T. Pascal, and B. Zimmern 9 Nov. 1982 15 p refs Transl. into ENGLISH of Conf. paper B2/15 Electricite de France, Chatou, 1979 Presented at the 15th Intern. Congr. of Refrig.: Refrig. and the Preserv. of World Resources, Venice, 23-29 Sep. 1979
(BLL-OA-Trans-1971-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

The feasibility of compression of steam by a water lubricated single screw compressor was demonstrated. The performance of the equipment was evaluated. S.L.

N83-16758*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ROLLING-ELEMENT FATIGUE LIFE OF AMS 5900 BALLS
Richard J. Parker Jan. 1983 13 p refs
(NASA-TP-2080; E-1190; NAS 1.60:2080) Avail: NTIS HC A02/MF A01 CSCL 13I

The rolling-element fatigue life of AMS 5900 12.7-mm (1/2-in.) dia was determined in five-ball fatigue testers. The 10% life with the warm headed AMS 5900 balls was equivalent to that of AMS 5749 and over eight times that of AISI M-50. The AMS balls fabricated by cold heading had small surface cracks which initiated fatigue spalls where these cracks were crossed by running tracks. The cold-headed AMS 5900 balls had a 10% fatigue life an order of magnitude less than that of the warm headed balls even when failures on the cold headed balls at visible surface cracks were omitted. Author

N83-16759*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ELASTOHYDRODYNAMIC LUBRICATION OF RECTANGULAR CONTACTS
Bernard J. Hamrock and Bo O. Jacobson (Lulea Univ.) Jan. 1983 30 p refs
(NASA-TP-2111; E-1277; NAS 1.60:2111) Avail: NTIS HC A03/MF A01 CSCL 11H

An isothermal elastohydrodynamically lubricated rectangular contact was evaluated numerically. This required the simultaneous solution of the elasticity and Reynolds equations. In the elasticity analysis the contact zone was divided into equal rectangular areas, and it was assumed that a uniform pressure was applied over each area. The elastohydrodynamic lubrication theory thus developed was used to investigate the influence of the dimensionless speed, load, and materials parameters on minimum film thickness. Ten cases were used in obtaining the minimum film thickness formula. Plots are shown that indicate the details of the pressure distribution, film shape, and flow. The characteristic pressure spike is clearly in evidence as is the parallel film shape through the central portion of the contact, with a minimum film thickness occurring near the outlet of the contact. S.L.

N83-16760# Battelle Columbus Labs., Ohio.
TECHNICAL AND SECRETARIAT SUPPORT OF THE MIL-STD-1515 FASTENER STANDARDIZATION EFFORT Final Report, Jun. 1976 - Mar. 1982
S. C. Ford and O. L. Deel Wright-Patterson AFB, Ohio Aeronautical Systems Div. May 1982 24 p
(Contract F33615-76-C-0803)
(AD-A119828; ASD-TR-82-5008) Avail: NTIS HC A02/MF A01 CSCL 05/2

This report presents the major activities associated with the subject contract. The Aeromechanical Fastener Requirements Group (AMFRG) composed of the Air Force, Navy, Army, prime aerospace manufacturers, and fastener manufacturers was reorganized in 1976 to efficiently prepare and maintain MIL-STD-1515, Fastener Systems for Aerospace Applications. Twice yearly meetings were arranged, attended, technical support provided, and minutes prepared and distributed. MIL-STD-1515 was completely revised and two change notices to the revised document were completed and published. Research programs involving stress corrosion, fatigue properties of recess head fasteners, and removal torque measurements of fasteners installed in various aircraft were completed during the contract term. Author (GRA)

N83-16761# TRW, Inc., Cleveland, Ohio. Materials Technology.
ESTABLISHMENT OF A CUTTING FLUID CONTROL SYSTEM, PHASE 2
G. A. Lieberman Ill. Rock Island Arsenal May 1982 157 p refs
(Contract DAAA08-80-C-0033)
(AD-A119820; TRW-ER-8156-F; SARRI-EN-82-08) Avail: NTIS HC A08/MF A01 CSCL 11/8

Phase II results are presented for the program entitled 'Establishment of a Cutting Fluid Control System.' The Phase II objectives were to conduct a systematic evaluation of available cutting fluid products, refine the Phase I preliminary RIA manufacturing process severity index and preliminary cutting fluid application matrix. The study showed the majority of observed machining operations involve milling, turning, grinding and boring procedures on 4100 series steels. A severity index was finalized which ranked all these processes relative to machining difficulty with respect to manufacturing parameters, tool design, workpiece hardness, and specific machining process. Commercially available cutting fluids were also categorized according to composition and manufacturer's

recommendations. A total of eighty-four fluids were recommended for testing by twenty-three cutting fluid manufacturers. Fluids were subjected to initial screening tests involving residue, rust and bacteria growth with selected fluids then employed in machining tests. The latter tests employed specially instrumented machine tools which provided force, power consumption, and tool wear data. Results are presented which indicate fluid performance levels are not necessarily related strictly to overall product formulations and that milling and turning require significantly different fluid properties. GRA

N83-16762# Naval Surface Weapons Center, White Oak, Md. Strategic Systems Dept.
DYNAMIC TESTING WITH THE NSWC 3-DEGREE-OF-FREEDOM GAS BEARING
F. J. Regan 8 Mar. 1982 138 p refs
(AD-A120828; AD-F500085; NSWC/TR-81-491) Avail: NTIS HC A07/MF A01 CSCL 14/2

This report presents the design, construction and operational procedures of the NSWC three degree of freedom gas bearing. The data reduction technique that is used with angular measurements from this support is developed and applied to measured wind tunnel data. These wind tunnel data were obtained from non ablating and ablating models undergoing dynamic motion in the NSWC Hypersonic Wind Tunnel. Test results are compared with earlier experiments with dynamic ablating models and theoretical speculations. GRA

N83-16763# Northern Research and Engineering Corp., Woburn, Mass.
RIT ROTOR VIBRATION TESTING
27 Sep. 1982 27 p ref
(Contract DE-AC03-79ET-15426)
(DE82-021024; DOE/ET-15426-T23) Avail: NTIS HC A03/MF A01

A radial inflow turbine (BIT) B rotor, including the impeller and shaft, was examined to determine vibratory characteristics. It is concluded that there are no specific speeds within the operating range with adequate resonance encorachment margins and it is recommended that performance tests be carried out with caution. DOE

N83-16764# Los Alamos Scientific Lab., N. Mex.
HYPERVELOCITY-IMPACT STUDIES ON TITANIUM, TITANIUM ALLOYS, AND BERYLLIUM
L. B. Lundberg, S. J. Bless (Dayton Univ.), S. P. Girrens, and J. E. Green (Dayton Univ.) Aug. 1982 67 p refs
(Contract W-7405-eng-36)
(DE82-021174; LA-9417-MS) Avail: NTIS HC A04/MF A01

The hypervelocity-impact behavior of commercial-pure, Grade 2Ti, Ti-5Al-2.5Sn, Ti-6Al-2Sn-4Zr-2Mo-0.25Si, and pure beryllium was studied by impacting targets of these materials with millimeter-sized spheres of glass, copper, aluminum, and cadmium propelled from a light-gas gun at velocities ranging from 4.5 to 7.6 km/s. Target temperatures ranged from 295 to 7750k when impacted. Semi-infinite targets were impacted to determine cratering behavior, and some correlations were made to thin-target perforation. Thin titanium targets with a variety of surface coatings and finishes were also impacted. Titanium and the titanium alloys were found to behave in a ductile manner when impacted, but beryllium was found to be brittle even at 7750K. An extrapolation equation was used to optimize a titanium heat pipe radiator mass for a space nuclear power application. DOE

N83-16765# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
WATER INJECTION INTO COMPRESSORS OF GAS TURBINES FOR POWER INCREASE AND REDUCTION OF NOX EMISSION Final Report, Dec. 1980
Michael Weichert Bonn Bundesministerium fuer Forschung und Technologie May 1982 54 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-075; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11,50

The injection of water into gas turbine compressors was investigated in order to increase the power and to reduce NOX emission. A test stand was erected. The use of coaxial rotational symmetrically mounted swirl nozzles enables the collection of large droplets before they enter the compressor. The use of ultrasound to produce water droplets of equal size promises even better results. Increase of power, improvement of compressor effiency and reduction of NOX emission are proven. This system can be used for all types of gas turbines, for different applications. Author (ESA)

N83-16766# Corporate-Tech Planning, Inc., Waltham, Mass.
THE ASSESSMENT OF VARIABLE VALVE TIMING OF INTERNAL COMBUSTION ENGINES FOR FUEL ECONOMY IMPROVEMENTS AND PRACTICABILITY Final Report, Aug. 1979 - Mar. 1981
Theodore Taylor, Jr. and Robert L. Kalin Washington DOT Dec. 1981 71 p refs
(Contract DOT-HS-9-02110)
(PB82-265364; DOT-HS-806-179) Avail: NTIS HC A04/MF A01 CSCL 21G

The potential effects of variable valve timing for improving automotive engine fuel economy. Methods of implementation of valve timing control and their practicability were also assessed. It is concluded that savings of 5 to 10% over the normal drive cycle are probably realizable providing emphasis is directed towards optimizing valve timing schedules at low speeds under low loads as opposed to the current practice of wide open throttle. Methods of implementation as reported from research programs and patent disclosures were also evaluated, categorized and assessed for manufacturing practicability. GRA

N83-16767# AGA A.B. Innovation, Lidingoe (Sweden).
OZONE AND NITROGEN OXIDES IN GAS SHIELDED ARC WELDING
1981 23 p refs
(PB82-266255; GIF-1073) Avail: NTIS HC A02/MF A01 CSCL 13B

The results of five years' research into the formation of ozone and nitrogen oxides in connection with gas shielded arc welding are described. A detailed description is given of amounts of these pollutants generated and how the concentrations vary in space under controlled airflow conditions. Methods are described of reducing ozone generation. GRA

N83-16768# Virginia Polytechnic Inst. and State Univ., Blacksburg. Coll. of Engineering.
WELD DISCONTINUITIES: NDI TECHNIQUE SELECTION CRITERIA AND FACTORS INFLUENCING ACCURACY, SENSITIVITY AND RELIABILITY
John C. Duke, Jr. 15 Aug. 1982 11 p
(PB82-258567) Avail: NTIS HC A02/MF A01 CSCL 13E

The philosophy that the successful solution of an engineering problem involving nondestructive evaluation requires both the ability to identify and characterize material imperfections, and the ability to assess their criticality, has been held to in the following report. In addition, no assumption regarding the validity of existing candidates for either category has been made. More directly stated, the assumption that fracture mechanics as presently formulated is sufficient to assess flaw criticality if provided with the necessary input from nondestructive testing is deliberately avoided. The purpose of this approach is not minimize the accomplishments of classical fracture mechanics, but to avoid naive application in inappropriate situations. In this report the term damage mechanics theory (DMT) is used to describe the general class of theories of which fracture mechanics--linear elastic, elastic plastic--are examples. Author (GRA)

N83-16769# Cambridge Univ. (England). Dept. of Engineering.
SOLUTION OF TWO PROBLEM CASES OF NON-

AXISYMMETRIC LOADING OF CORRUGATED BELLOWS BY THE MARC-CDC GENERAL PURPOSE STRUCTURAL ANALYSIS PROGRAM. REPORT TO THE UKAEA CULHAM LABORATORY, ABINGDON, OXFORDSHIRE Final Report, Dec. 1978 - Dec. 1981

N. W. Snedden Dec. 1981 53 p

(PB82-253758; CUED/C-MECH/TR-20; ISSN-0309-7420) Avail: NTIS HC A04/MF A01 CSCL 13E

Pinched loading and magnetic shear related to a fusion research experiment which uses a toroidal vacuum vessel fabricated from curved bellows segments are considered. A finite element model is used. A FORTRAN program which generates mesh input data for a bellows with any number of corrugations is described. The program is sufficiently general to allow variation in the number and size of elements, in both principal directions, forming the bellows corrugation. A card deck of MARC input data is discussed for one of the two problems analyzed. In addition to results of component stresses in the bellows, tables are provided summarizing the important nodal point data for the two problems. To confirm the validity of the solutions obtained, a comparison is made with results of approximate methods of analysis. GRA

N83-16770# Welding Inst., Cambridge (England).

ULTRASONIC MEASUREMENT OF WELD FLAW SIZE Final Report

T. J. Jessop, P. J. Mudge, and J. D. Harrison Dec. 1981 86 p refs Sponsored in part by the American Association of State Highway and Transportation Officials and Federal Highway Administration

(Contract HR10-13)

(PB82-257825; TRB/NCHRP/REP-242; ISBN-0-309-03302-0; ISSN-0077-5614) Avail: NTIS HC A05/MF A01; also available from Transportation Research Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418 CSCL 13E

An investigation into the reliability and accuracy of ultrasonic non-destructive testing techniques for evaluating fabrication defects in welds such as those which may be found in steel bridge structures is described. This was done by manufacturing specimens with defects, testing them using various ultrasonic procedures, and finally sectioning them to enable the actual defect to be compared with the ultrasonic prediction. The ultrasonic procedures found in the American Welding Society Structural Welding Code D1,1-80 were evaluated as were the probe movement and time-of-flight techniques for defect through-thickness size measurement. The results are presented in terms of the accuracy of the ultrasonic prediction and reference is made to the effect of operator and equipment variations. GRA

N83-16771# Lund Inst. of Tech. (Sweden). Machine Elements Div.

TRANSACTIONS OF MACHINE ELEMENTS DIVISION: ON HYDRODYNAMIC TORQUE CONVERTERS

Sven Anderson 1982 141 p refs

(PB82-154368) Avail: NTIS HC A07/MF A01 CSCL 13G

The flow and associated quantities from given geometry and rotational speeds assuming two dimensional frictionless, and stationary flow are calculated. The blades are assumed to be very thin and the fluid to have constant density. GRA

N83-17373*# Alabama Univ., Huntsville. Dept. of Physics.

CHROMIUM ION PLATING STUDIES FOR ENHANCEMENT OF BEARING LIFETIME

Jack H. Davis *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 8 p refs (For primary document see N83-17359 07-80)

Avail: NTIS HC A99/MF A01 CSCL 13I

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N83-16772 Propellants, Explosives and Rocket Motor Establishment, Westcott (England).

RELIABILITY ANALYSIS OF STRUCTURES WITH WEIBULL DISTRIBUTIONS OF LOAD AND STRENGTH TO A GIVEN CONFIDENCE LEVEL

J. Margetson and J. F. Laurillard Jul. 1982 28 p refs

(PERME-TR-182; BR83968) Copyright. Avail: Issuing Activity

The structural reliability of materials presenting inherent variability is assessed from a mathematical analysis based on the test results from a small sample of components. The statistical variation of load and strength is described by a three parameter Weibull distribution. The Weibull parameters are evaluated by a least square analysis and a method which allows confidence bounds to be assigned to these quantities is presented. A Monte Carlo analysis is used to calculate the reliability of the structure from the load and strength distributions. Author (ESA)

N83-16773*# Ohio State Univ., Columbus. Dept. of Engineering Mechanics.

THE TRANSMISSION OR SCATTERING OF ELASTIC WAVES BY AN INHOMOGENEITY OF SIMPLE GEOMETRY: A COMPARISON OF THEORIES Final Report

Y. C. Sheu and L. S. Fu Washington NASA Jan. 1983 91 p refs

(Grant NsG-3269)

(NASA-CR-3659; E-1394; NAS 1.26:3659; RF-Tech-104) Avail: NTIS HC A05/MF A01 CSCL 20N

The extended method of equivalent inclusions is applied to study the specific wave problems: (1) the transmission of elastic waves in an infinite medium containing a layer of inhomogeneity, and (2) the scattering of elastic waves in an infinite medium containing a perfect spherical inhomogeneity. Eigenstrains are expanded as a geometric series and a method of integration based on the inhomogeneous Helmholtz operator is adopted. This study compares results, obtained by using limited number of terms in the eigenstrain expansion, with exact solutions for the layer problem and that for a perfect sphere. S.L.

N83-16774# Boeing Co., Seattle, Wash.

RELIABILITY PARTS DERATING GUIDELINES Final Report, Feb. 1981 - Apr. 1982

S. L. Brummett, D. A. Cross, R. L. Davis, and D. C. Towns Griffiss AFB, N.Y. RADC Jun. 1982 259 p refs

(Contract F30602-81-C-0073; AF Proj. 2338)

(AD-A120367; RADC-TR-82-177) Avail: NTIS HC A12/MF A01 CSCL 09/1

Derating can be defined as the practice of limiting electrical, thermal and mechanical stresses on devices to levels below their specified or proven capabilities in order to enhance reliability. If a system is expected to be reliable, one of the major contributing factors must be a conservative design approach incorporating part derating. Realizing a need for derating of electronic and electromechanical parts, many manufacturers have established internal guidelines for derating practices. The Air Force, on the other hand, has no established guide or base line for evaluating the validity of the numerous deratings proposed by industry. Therefore, the objective of this effort was to develop and publish guidelines for part derating to be used as standards for evaluating contractor's design and to establish values to be implemented in system and equipment specifications. This document has established part derating levels based on mission critically for the majority of devices included in MIL-HDBK-217. Part design application guidelines were also developed. This study indicated that some advanced technology devices (VLSI, bubble memory, microwave semiconductors, etc.) has little or no available derating data and will require a more in-depth follow on report. Author (GRA)

N83-16775# IIT Research Inst., Chicago, Ill.
R/M ANALYSIS OF ELECTROMECHANICAL EQUIPMENTS Final Technical Report, 31 Dec. 1980 - 28 Feb. 1982
Joseph J. Steinkirchner Griffiss AFB, N.Y. RADC May 1982 185 p refs
(Contract F30602-81-C-0046; AF Proj. 2338)
(AD-A120368; RADC-TR-82-141) Avail: NTIS HC A09/MF A01 CSCL 09/1

This report presents the analyses and results of a fourteen-month effort to investigate problem areas and determine the impact of ancillary electromechanical (E/M) equipment on USAF C3I system reliability and maintainability (R/M). Equipment and system level field experience data were collected and compared with the specified equipment and system level reliability and maintainability (R/M) numerics. Author (GRA)

N83-16776# Department of Defense, Washington, D. C.
TEST AND EVALUATION OF SYSTEM RELIABILITY, AVAILABILITY AND MAINTAINABILITY. A PRIMER
John C. Conlon, Walter A. Lilius, and Frank H. Tubbesing, Jr. Mar. 1982 300 p
(AD-A120261; DOD-3235.1-H) Avail: NTIS HC A13/MF A01 CSCL 15/5

The acquisition of military weapon systems and equipment requires verification that the candidate systems do, in fact, perform in accordance with previously specified operational requirements. This verification process involves the design of test programs which provide an adequate data base to support realistic assessments of hardware characteristics. This text outlines the various statistical concepts and techniques to be used in structuring such test programs and analyzing the resulting data. GRA

N83-16777# Sandia Labs., Albuquerque, N. Mex.
INTERIM RELIABILITY EVALUATION PROGRAM (IREP)
David D. Carlson and Joseph A. Murphy (Nuclear Regulatory Commission) 1981 4 p Presented at the Ann. Meeting of the German Nucl. Soc., Mannheim, West Germany, 4 May 1981
(Contract DE-AC04-76DP-00789)
(DE82-004132; SAND-81-2625C; CONF-81051331) Avail: NTIS HC A02/MF A01

The Interim Reliability Evaluation Program (IREP), sponsored by the Office of Nuclear Regulatory Research of the US Nuclear Regulatory Commission, is currently applying probabilistic risk analysis techniques to two PWR and two BWR type power plants. Emphasis was placed on the systems analysis portion of the risk assessment, as opposed to accident phenomenology or consequence analysis, since the identification of risk significant plant features was of primary interest. Traditional event tree/fault tree modeling was used for the analysis. However, the study involved a more thorough investigation of transient initiators and of support system faults than studies in the past and substantially improved techniques were used to quantify accident sequence frequencies. This study also attempted to quantify the potential for operator recovery actions in the course of each significant accident. DOE

N83-16778# Bosch-Siemens Hausgeraete G.m.b.H., Giengen (West Germany).
CONTROL OF THE POWDER-COATING PROCESS: THICKNESS MEASUREMENT AND ACQUISITION OF DATA FOR THE POWDER-SPRAY Final Report, Dec. 1980
Wolfram Wacker Bonn Bundesministerium fuer Forschung und Technologie Sep. 1982 71 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-165; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

A contactless, nondestructive method for measuring layer thickness during powder coating is described. The device is based on X-ray absorption and can be used either as a measuring unit or as the principal part of a semi or fully automatic powder coating plant. Idling time of the closed loop control system (powder coating checking results of the coating - correcting the coating parameter) is considerably reduced compared with traditional systems. Energy and raw materials are saved and noxious emission is diminished. The system can also be applied to wet painting. Author (ESA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N83-16779# Electricity Council, London (England). Overseas Relations Branch.
DETERMINATION OF INTERNAL STRESS IN ELECTROPLATINGS
Sh. Z. Zakirov and Yu. N. Petrov Nov. 1982 7 p refs Transl. into ENGLISH from Zavosk. Lab. (USSR), v. 23, no. 12, 1957 p 1495-1496
(BLL-OA-Trans-1803-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

A method for calculating internal stesses in electrolytic coating on metals was developed from the relationship between the hardness of the coating on plates and on a nondeformable cathode. Plates prepared from black sleet steel which had identical dimensions except for the thickness, insulated on one side with a layer of shellac of 0.1 mm thickness were used. The surface of the plate to be coated was degreased with kerosine and French chalk, followed by washing with hot and cold water, pickled in hydrochloric acid for a period of 15 to 20 minutes and then washed with hot water and dipped into an ironplating bath at D sub a = 10 a/ sq dm for a period of 15 to 20 sec. S.L.

N83-16780 National Physical Lab., Teddington (England). Div. of Materials Applications.
A NEW BOUNDARY ELEMENT TECHNIQUE FOR SOLVING PLANE PROBLEMS OF LINEAR ELASTICITY. PART 1: THEORY
L. N. McCartney Sep. 1982 40 p ref
(NPL-DMA(A)53; ISSN-0143-7313) Copyright. Avail: Issuing Activity

A boundary element technique for solving plane problems of linear elasticity theory is described. The method is based upon the Muskhelishvili complex variable representation of the displacement and stress fields involving two independent complex functions. These functions are represented by complex Cauchy integrals where the path of integration is taken around the external boundary of the solid. Two complex density functions appearing in the integrands of the Cauchy integrals are represented by spline functions and these are determined by the application of appropriate boundary conditions. The theory presented is suitable only for bounded simply-connected regions although it is indicated how it may be modified to solve exterior problems. Author (ESA)

N83-16781*# Lehigh Univ., Bethlehem, Pa.
CRACKED SHELLS UNDER SKEW-SYMMETRIC LOADING
F. Lelale (Drexel Univ., Philadelphia, Pa.) Sep. 1982 54 p refs (Grants NGR-39-007-011; NSF CME-78-09737)
(NASA-CR-165987; NAS 1.26:165987) Avail: NTIS HC A04/MF A01 CSCL 20K

A shell containing a through crack in one of the principal planes of curvature and under general skew-symmetric loading is considered. By employing a Reissner type shell theory which takes into account the effect of transverse shear strains, all boundary conditions on the crack surfaces are satisfied separately. Consequently, unlike those obtained from the classical shell theory, the angular distributions of the stress components around the crack tips are shown to be identical to the distributions obtained from the plane and antiplane elasticity solutions. Extensive results are given for axially and circumferentially cracked cylindrical shells, spherical shells, and toroidal shells under uniform inplane shearing,

out of plane shearing, and torsion. The effect of orthotropy on the results is also studied. S.L.

N83-16782*# Lehigh Univ., Bethlehem, Pa.
THE CRACK PROBLEM IN A SPECIALLY ORTHOTROPIC SHELL WITH DOUBLE CURVATURE
F. Delale (Drexel Univ., Philadelphia, Pa.) and F. Erdogan Sep. 1982 37 p refs
(Grants NGR-39-007-011; NSF CME-78-09737)
(NASA-CR-165999; NAS 1.26:165999) Avail: NTIS HC A03/MF A01 CSCL 20K

The crack problem of a shallow shell with two nonzero curvatures is considered. It is assumed that the crack lies in one of the principal planes of curvature and the shell is under Mode I loading condition. The material is assumed to be specially orthotropic. After giving the general formulation of the problem the asymptotic behavior of the stress state around the crack tip is examined. The analysis is based on Reissner's transverse shear theory. Thus, as in the bending of cracked plates, the asymptotic results are shown to be consistent with that obtained from the plane elasticity solution of crack problems. Rather extensive numerical results are obtained which show the effect of material orthotropy on the stress intensity factors in cylindrical and spherical shells and in shells with double curvature. Other results include the stress intensity factors in isotropic toroidal shells with positive or negative curvature ratio, the distribution of the membrane stress resultant outside the crack, and the influence of the material orthotropy on the angular distribution of the stresses around the crack tip. S.L.

N83-16783*# Lehigh Univ., Bethlehem, Pa.
A CYLINDRICAL SHELL WITH AN ARBITRARILY ORIENTED CRACK
O. S. Yahsi and F. Erdogan Sep. 1982 56 p refs
(Grant NGR-39-007-011; Contract DOT-RC-82007; Grant NSF CME-78-09737)
(NASA-CR-166000; NAS 1.26:166000) Avail: NTIS HC A04/MF A01 CSCL 20K

The general problem of a shallow shell with constant curvatures is considered. It is assumed that the shell contains an arbitrarily oriented through crack and the material is specially orthotropic. The nonsymmetric problem is solved for arbitrary self equilibrating crack surface tractions, which, added to an appropriate solution for an uncracked shell, would give the result for a cracked shell under most general loading conditions. The problem is reduced to a system of five singular integral equations in a set of unknown functions representing relative displacements and rotations on the crack surfaces. The stress state around the crack tip is asymptotically analyzed and it is shown that the results are identical to those obtained from the two dimensional in plane and antiplane elasticity solutions. The numerical results are given for a cylindrical shell containing an arbitrarily oriented through crack. Some sample results showing the effect of the Poisson's ratio and the material orthotropy are also presented. M.G.

N83-16784*# Astro Research Corp., Carpinteria, Calif.
DESIGN CONCEPTS FOR LARGE REFLECTOR ANTENNA STRUCTURES Final Report
John M. Hedgepeth and Louis R. Adams Washington NASA Jan. 1983 82 p refs
(Contract NAS1-16134)
(NASA-CR-3663; NAS 1.26:3663; ARC-R-1018) Avail: NTIS HC A05/MF A01 CSCL 20K

Practical approaches for establishing large, precise antenna reflectors in space are described. Reflector surfaces consisting of either solid panels or knitted mesh are considered. The approach using a deep articulated truss structure to support a mesh reflector is selected for detailed investigations. A new sequential deployment concept for the tetrahedral truss is explained. Good joint design is discussed, and examples are described both analytically and by means of demonstration models. The influence of curvature on the design and its vibration characteristics are investigated. Author

N83-16785*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VIBRATION STUDIES OF A LIGHTWEIGHT THREE-SIDED MEMBRANE SUITABLE FOR SPACE APPLICATION
John L. Sewell, Robert Miserentino, and Richard S. Pappa Jan. 1983 49 p refs
(NASA-TP-2095; L-15247; NAS 1.60:2095) Avail: NTIS HC A03/MF A01 CSCL 20K

Vibration studies carried out in a vacuum chamber are reported for a three-sided membrane with inwardly curved edges. Uniform tension was transmitted by thin steel cables encased in the edges. Variation of ambient air pressure from atmospheric to near vacuum resulted in increased response frequencies and amplitudes. The first few vibration modes measured in a near vacuum are shown to be predictable by a finite element structural analysis over a range of applied tension loads. The complicated vibration mode behavior observed during tests at various air pressures is studied analytically with a nonstructural effective air-mass approximation. The membrane structure is a candidate for reflective surfaces in space antennas. M.G.

N83-16786*# Boeing Aerospace Co., Seattle, Wash.
DESIGN, FABRICATION AND TEST OF GRAPHITE/POLYMIDE COMPOSITE JOINTS AND ATTACHMENTS: SUMMARY Final Report
J. B. Cushman, S. F. McCleskey, and S. H. Ward Washington NASA Jan. 1983 91 p refs
(Contract NAS1-15644)
Avail: NTIS HC A05/MF A01 CSCL 20K

The design, analysis and testing performed to develop four types of graphite/polyimide (Gr/PI) bonded and bolted composite joints for lightly loaded control surfaces on advanced space transportation systems that operate at temperatures up to 561K (550 F) are summarized. Material properties and 'small specimen' tests were conducted to establish design data and to evaluate specific design details. 'Static discriminator' tests were conducted on preliminary designs to verify structural adequacy. Scaled up specimens of the final joint designs, representative of production size requirements, were subjected to a series of static and fatigue tests to evaluate joint strength. Effects of environmental conditioning were determined by testing aged (125 hours @ 589K (600 F)) and thermal cycled (116K to 589K (-250 F to 600 F), 125 times) specimens. It is concluded Gr/PI joints can be designed and fabricated to carry the specified loads. Test results also indicate a possible resin loss or degradation of laminates after exposure to 589K (600 F) for 125 hours. S.L.

N83-16787*# Boeing Aerospace Co., Seattle, Wash.
TEST AND ANALYSIS OF CELION 3000/PMR-15, GRAPHITE/POLYIMIDE BONDED COMPOSITE JOINTS: SUMMARY Final Report
J. B. Cushman, S. F. McCleskey, and S. H. Ward Washington NASA Jan. 1983 75 p refs
(Contract NAS1-15644)
(NASA-CR-3602; NAS 1.26:3602) Avail: NTIS HC A04/MF A01 CSCL 20K

Standard single lap, double lap and symmetric step lap bonded joints of Celion 3000/PMR-15 graphite/polyimide composite were evaluated. Composite to composite and composite to titanium joints were tested at 116K (-250 F), 294K (70 F) and 561K (550 F). Joint parameters evaluated were lap length, adherend thickness, adherend axial stiffness, lamina stacking sequence and adherend tapering. Tests of advanced joint concepts were also conducted to establish the change in performance of preformed adherends, scallopd adherends and hybrid systems. Special tests were conducted to establish material properties of the high temperature adhesive, designated A7F, used for bonding. Most of the bonded joint tests resulted in interlaminar shear or peel failures of the composite. There were very few adhesive failures. Average test results agree with expected performance trends for the various test parameters. Results of finite element analyses and of test/analysis correlations are also presented. S.L.

N83-16788# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
CORROSION VERIFICATION AND CONTROL OF PRESSURE VESSELS, AIR AND OIL. CALCULATION OF RESIDUAL LIFE OF THE VESSELS
L. X. Nepomuceno and T. B. Silverio 5 Nov. 1982 40 p In PORTUGUESE; ENGLISH summary
(Rept-440-82-A/E) Avail: NTIS HC A03/MF A01

The spots where the thickness measurements were made are described, indicating the positioning and values. The residual life of each vessel after roughly ten years of continuous service is calculated, illustrating the corrosion development in function of time. S.L.

N83-16789# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
SITE CHARACTERIZATION FOR PROBABILISTIC GROUND SHOCK PREDICTIONS Final Report
J. G. Jackson, Jr. Jul. 1982 50 p refs Presented at the DNA Strategic Struct. Div. Rev. Conf., Menlo Park, Calif., 4-6 May 1982
(AD-A120398; WES/MP/SL-82-8) Avail: NTIS HC A03/MF A01 CSCL 19/4

A probabilistic methodology is described for determining the statistical distribution of vertical rattlespace required for MX multiple protective shelters sited within the alluvial valleys of central Nevada and eastern Utah. The approach involves: (1) identification of the critical ground motion parameters and the input quantities which dominate their calculation; (2) conducting field and laboratory investigations to define the statistical variation of these quantities within the siting area; and (3) performing ground motion calculations with a probabilistic wave propagation code. Calculations for the high explosive Dynamic In-Situ Compressibility (DISC) tests conducted in Ralston Valley, Nevada, are used to illustrate the probabilistic methodology. GRA

N83-16790# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Mechanical and Industrial Engineering.
FINITE ELEMENT MODELING OF ELASTIC-PLASTIC CRACK GROWTH Final Report, 1 Jun. 1981 - 31 May 1982
Francis T. C. Loo Jul. 1982 45 p refs
(Contract AF-AFOSR-0174-81; AF Proj. 2307)
(AD-A120478; AFOSR-82-0909TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Numerical methods for the analysis of the elastoplastic fracture problem using a special finite element technique are presented. A brief description of some concepts in elastoplastic fracture mechanics and of the finite element method is followed by the formulation procedure of the stiffness matrix using eight noded quadrilateral isoparametric elements. The initial stress method is discussed and the procedure of computation is extended in the analysis by using an incremental load process. The size and the shape of the plastic zone of a center crack specimen is investigated. The problem of crack growth is also studied using the moving crack tip element procedure. Results are presented in graphical form. It is found that the moving finite element technique can be modified to solve the crack branching problems. GRA

N83-16791# Swedish Council for Building Research, Stockholm.
STEEL STRUCTURES SUBJECTED TO DYNAMIC LOADS IN CONNECTION WITH PROGRESSIVE COLLAPSE. DYNAMIC BUCKLING
Per Christiansson 1983 120 p refs
(PB82-262122; ISBN-91-540-3681-X) Avail: NTIS HC A06/MF A01 CSCL 13M

When a building is subjected to local damage there is a risk that the damage will develop into a progressive collapse. One way of reducing this risk is to provide for an alternative load-carrying system. It is however possible that the structure will not sustain the dynamic effects during the transition stage before the alternative bearing system is developed. This report contains a study of the dynamic transition stage, with special reference to dynamic column buckling. GRA

N83-16792# Los Alamos Scientific Lab., N. Mex.
EXPERIMENTS ON PLASTIC DEFORMATION AT FINITE STRAINS
S. S. Hecker, M. G. Stout, and D. T. Eash 1981 40 p Presented at the Conf. on Plasticity of Metals at Finite Strain: Theory, Expt. and Computation, Stanford, Calif., 29 Jun. - 1 Jul. 1981
(Contract W-7405-eng-36)
(DE82-004374; LA-UR-81-3447; CONF-8106184-1) Avail: NTIS HC A03/MF A01

The strain hardening behavior of metals at large plastic strains is difficult to assess experimentally. Consequently, many different techniques have been used to study such behavior and no clear experimental picture has evolved. In this paper experiments are reviewed on finite plastic deformation with emphasis on work reported since the comprehensive review of Gil Sevillano, van Houtte, and Aernoudt. The macroscopic strain hardening behavior is the primary concern, but its dependence on crystal structure, purity, alloying, microstructure, stacking fault energy, grain size, and deformation mode, is also discussed. DOE

N83-16793# California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Materials Science and Mineral Engineering.
WHY DUCTILE FRACTURE MECHANICS?
Robert O. Ritchie Oct. 1981 33 p refs Presented at the Symp. on Ductile Fracture Mech., the 102d Ann. Winter Meeting of ASME, Washington, D.C., 15-20 Nov. 1981
(Contract W-7405-eng-48)
(DE82-003621; LBL-13359; CONF-811101-12) Avail: NTIS HC A03/MF A01

Until recently, the engineering application of fracture mechanics has been specific to a description of macroscopic fracture behavior in components and structural parts which remain nominally elastic under loading. Whilst this approach, termed linear elastic fracture mechanics, has been found to be invaluable for the continuum analysis of crack growth in brittle and high strength materials, it is a clearly inappropriate for characterizing failure in lower strength ductile alloys where extensive inelastic deformation precedes and accompanies crack initiation and subsequent propagation. In this paper, the concepts of ductile (elastic/plastic) fracture mechanics are introduced and applied to the problem of both stationary and nonstationary cracks. Specifically, the limitations inherent in this approach are defined, together with a description of the microstructural considerations and applications relevant to the failure of ductile materials by fracture, fatigue and creep. DOE

N83-16794# Sandia Labs., Albuquerque, N. Mex.
AXISYMMETRIC SOLUTIONS IN ELASTOSTATICS AND ELASTIC WAVE PROPAGATION BY ASCENT METHODS
Frederick R. Norwood 1981 3 p refs Presented at the 9th US Natl. Congr. of Appl. Mech., Ithaca, N.Y., 21 Jun. 1981
(Contract DE-AC04-76DP-00789)
(DE82-006283; SAND-81-1729C; CONF-8106189-1) Avail: NTIS HC A02/MF A01

In the present work a method of ascent for axisymmetric problems is developed. It is shown that, for problems where the vector or scalar Laplacian operator specifies the space behavior of the potential functions, the three-dimensional axisymmetric problems may be solved by operating on the solution to an associated two-dimensional problem. Hence, the theoretical results presented here may be applied to heat transfer problems, to problems in elastostatics and to elastic wave propagation problems. DOE

N83-16795# Science Applications, Inc., San Jose, Calif.
STRESS-INTENSITY FACTORS FOR SURFACE CRACKS IN PIPES: A COMPUTER CODE FOR EVALUATION BY USE OF INFLUENCE FUNCTIONS Final Report
D. D. Dedhia and D. O. Harris Jun. 1982 75 p refs
(EPRI Proj. 1757-8)
(DE82-906468; EPRI-NP-2425) Avail: NTIS HC A04/MF A01

A user oriented computer program for the evaluation of stress intensity factors for cracks in pipes is presented. Stress intensity

factors for semielliptical, complete circumferential and long longitudinal cracks can be obtained using this computer program. The code is based on the method of influence functions which makes it possible to treat arbitrary stresses on the plane of the crack. The stresses on the crack plane can be entered as a mathematical or tabulated function. A user's manual is included.
DOE

N83-16796# Oak Ridge National Lab., Tenn.
RELATIONSHIPS BETWEEN CHARPY V-NOTCH IMPACT ENERGY AND FRACTURE TOUGHNESS
J. R. Dougan Mar. 1982 97 p refs
(Contract W-7405-eng-26)
(DE82-009313; ORNL/TM-7921; NUREG/CR-2362) Avail: NTIS HC A05/MF A01

Correlations between Charpy V-notch impact energy and fracture toughness are investigated. Three distinct types of correlations were examined: (1) the Rolfe-Novak-Barsom upper shelf correlation, (2) the hyperbolic tangent (tanh) correlation, and (3) the J-delta correlation. The Rolfe-Novak-Barsom correlation is a straight line relationship between functions of the Charpy energy and the static initiation toughness, while the tanh correlation relates functions of the Charpy energy and either the static or the dynamic toughness through the use of statistically determined curve fits based on the tanh curve. The J-delta correlation represents power law estimates of resistance curves in the upper shelf temperature range.
DOE

N83-16797# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section Construction Metallique.
EXPERIMENTAL STUDY OF SOLID WEB BEAMS WITH DIAGONAL STIFFENERS, PART 2 [ETUDE EXPERIMENTELLE DE POUTRES A AME PLEINE AVEC RAIDISSEURS DIAGONAUX]
P. Jetteur Sep. 1982 93 p refs In FRENCH Sponsored by Inst. pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture
(CRIF-MT-148-Pt-2) Avail: NTIS HC A05/MF A01

Beams containing rectangular web plates reinforced with diagonal stiffeners were studied in order to determine the load capacity increment. Results show that the behavior of the reinforced beams is substantially the same as beams without reinforcement, except that the breaking load is considerably increased.
Author (ESA)

N83-16798# Bristol Univ. (England). Dept. of Aeronautical Engineering.
THE STRUCTURAL BEHAVIOUR OF A CANTILEVER BEAM CONSISTING OF THREE INFLATABLE CYLINDERS B.S. Thesis
P. G. Manson and T. Mills Jun. 1982 67 p refs
(BU-281) Avail: NTIS HC A04/MF A01

Inflatable spanwise cylinders are considered for the wing structure of small remotely piloted vehicles. A single cylinder with internal diaphragms was tested to find major differences compared with unreinforced cylinders. Three cylinders with internal ribs were combined into a single structure and tested for bending, torsion and combined loadings. Differences between the behavior of this structure and the single cylinder were observed and theories were developed to account for these differences. An outer covering was added, and a distributed loading was used to simulate aerodynamic loads. It is found that the addition of ribs to the single cylinder slightly improves stiffness compared with cylinders without ribs. The three cylinder structure behaves as expected and the theories developed to predict its structural behavior agree reasonably well with experimental results. The distributed loading does not produce any significant twist on the structure, which behaves as if it were subjected to bending only. The three cylinder structure is found to be a viable aerodynamic load bearing structure.
Author (ESA)

N83-16799# Centre Technique des Industries Mecaniques, Senlis (France).
MECHANICAL ANALYSIS OF THE BRITTLE FRACTURE OF A WELDED ASSEMBLY IN THE PRESENCE OF A FAULT IN THE MOLTEN METAL Final Report [ANALYSE MECANIQUE DE LA RUPTURE FRAGILE D'UN ASSEMBLAGE SOUDE EN PRESENCE D'UN DEFAUT DANS LE METAL FONDU]
A. Chaudouet 2 Aug. 1982 76 p refs In FRENCH
(CETIM-11-C-170) Avail: NTIS HC A05/MF A01

Masubuchi's brittle fracture model which predicts crack initiation, propagation and limits in the presence of residual stress was examined. Analytic determination of the stress intensity factor of a defective welded assembly, with known applied stress and residual stress due to welding, was attempted. Two cases were analyzed: small scale defects which followed the axes of symmetry of the assembly; and a large scale defect perpendicular to the weld. Comparison of numerical and analytical results shows that for large scale defects, redistribution of residual stress during crack propagation is such that the analytical formulas cannot be used to calculate the stress intensity factor.
Author (ESA)

N83-16800# Instituto TNO voor Bouwmaterialen en Bouwconstructies, Delft (Netherlands).
DETERMINATION OF SURFACE STRAINS FOR OBJECTS OF ARBITRARY SHAPE IN HOLOGRAPHIC-MOIRE INTERFEROMETRY
W. J. Beranek and A. J. A. Bruinsma 1981 13 p refs
(PB82-262726; BI-82-9/62.1.5230) Avail: NTIS HC A02/MF A01 CSCL 20K

Surface strains for objects of arbitrary shape are determined, using holographic-moire, with illumination in collimated light and observation from one point (camera). Contourline maps for the three orthogonal displacement components are used, from which the 'basic strains' are determined as if the object were flat. The shape of the object is determined by contouring holography or shadow-moire. The 'basic slopes' of the object are determined as if observation were from infinity. The photographs of the interference pattern and the shape of the object serve as reference planes. Formulas are derived in which the surface strains of a nonrectangular surface element are expressed into the following known quantities of a rectangular reference element: coordinates of the regarded point, basic strains and basic slopes.
GRA

N83-16801# Structural Engineering Research Centre, Madras (India).
SHELL STRUCTURES: TWO RESEARCH PAPERS
Zacharia George 1982 20 p
(PB82-260852) Avail: NTIS HC A02/MF A01 CSCL 13M

A project involving the use of shell structures demands that the construction method is considered along with the analysis and design. In case of shells, it is often the factor which decides the design. This is because, from the design point of view, the major portion of the design load is in the form of self weight, very often exceeding 75% of the total design load. The construction method and equipment available also decides the layout of the shells. If cost is the primary consideration, it is the construction method which controls the cost factor of the shell structures. The most difficult component of construction of shells is the form work, both from the point of view of cost and intricacy. To overcome the difficulties presented by the formwork and centering, prefabrication is resorted to for building of shells.
GRA

N83-16802# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
SCOURING PATTERNS IN FRONT OF VERTICAL BREAKWATERS AND THEIR INFLUENCES ON THE STABILITY OF THE FOUNDATIONS OF THE BREAKWATERS
Xie Shi-Leng Sep. 1981 125 p refs
(PB82-262130) Avail: NTIS HC A06/MF A01 CSCL 13B

There are two basic types of scouring pattern of a sand bed in front of a vertical breakwater under the action of standing waves. Two criteria which may distinguish these two types of scouring pattern were first found in the present study. Both of them express that the scouring patterns are dependent on the sand grain sizes as well as the wave conditions. The expressions of the scouring

profiles, the ultimate maximum scouring depths and the developments of the scouring for two scouring patterns corresponding to relatively fine and coarse materials are all given based on the experimental data. Author (GRA)

N83-16803# Transport and Road Research Lab., Crowthorne (England). Bridges Div.
THE MICROSTRUCTURE OF EPOXY BONDED STEEL-TO-CONCRETE JOINTS Final Report
G. O. Lloyd (National Physical Lab.) and A. J. J. Calder 1982 24 p refs
(PB82-252479; TRRL/SR-705; TRRL-SUPPLEMENTARY-705; ISSN-0305-1315) Copyright. Avail: NTIS HC A02/MF A01 CSCL 13M

Exposure tests were carried out on concrete beams (508mm x 102mm) strengthened by a single mild steel plate bonded to the surface of the concrete using a structural grade epoxy adhesive containing a siliceous filler. Visual examination showed that corrosion of the steel plate can take place at the interface between the steel and the adhesive. The existence of chlorides in the corrosion product was also detected. Similar results were observed for a small section of plate removed from a strengthened highway bridge. A microstructural analysis of the concrete/resin system using maker solutions and electron microscopy revealed cracks and pores in the concrete and the resin. These cracks were shown to act as routes for corrosive liquids to reach the steel plate and cause corrosion. The use of a chromate primer on the steel plate was successful in inhibiting the corrosion without greatly affecting the structural strength. Author (GRA)

N83-16804# Cambridge Univ. (England). Dept. of Engineering.
MECHANISMS OF DEFORMATION AND FRACTURE Final Report
M. F. Ashby Jan. 1982 102 p refs
(PB82-254178; CUED/C-MATS/TR-92; ISSN-0309-6505) Avail: NTIS HC A06/MF A01 CSCL 20L

Complex phenomena such as deformation or fracture, involving several competing mechanisms, were presented in the form of diagrams or maps which showed the range of variables i.e., stress and temperature, over which each separate competing mechanism was dominant. The maps were constructed empirically in the case of fracture or, by using constitutive laws, in the case of deformation. It was found that groups of materials with the same crystal structure, bonding, purity and microstructure, had closely similar maps. Maps were constructed for Ni, Nimonic-80 alloy, W. Mg, NaCl, MgO, Al2O3 and ice (important for offshore structural design). It was demonstrated that the maps permit the quick identification of the dominant mechanism for a given engineering application, that they help in alloy selection and design and that they allow a body of detailed data to be presented simply in a readily accessible form. GRA

N83-17380*# Washington State Univ., Pullman. Dept. of Mechanical Engineering.
FINITE ELEMENT ANALYSIS OF A DEPLOYABLE SPACE STRUCTURE
David V. Hutton *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20K

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N83-16805* National Aeronautics and Space Administration, Washington, D. C.
EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES, ISSUE 35
Oct. 1982 160 p
(NASA-SP-7041(35); NAS 1.21:7041(35)) Avail: NTIS HC A08 CSCL 05B

This bibliography list 587 reports, articles, and other documents introduced into the NASA Scientific and Technical Information System between July 1, and September 30, 1982. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis. Author

N83-16806*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVALUATION OF THE CEAS MODEL FOR BARLEY YIELDS IN NORTH DAKOTA AND MINNESOTA
T. L. Barnett, Principal Investigator Dec. 1981 49 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Proj. AgRISTARS)
(E83-10042; NASA-TM-85168; YM-U2-04288; JSC-18235; NAS 1.15:85168) Avail: NTIS HC A03/MF A01 CSCL 02C

The CEAS yield model is based upon multiple regression analysis at the CRD and state levels. For the historical time series, yield is regressed on a set of variables derived from monthly mean temperature and monthly precipitation. Technological trend is represented by piecewise linear and/or quadriatic functions of year. Indicators of yield reliability obtained from a ten-year bootstrap test (1970-79) demonstrated that biases are small and performance as indicated by the root mean square errors are acceptable for intended application, however, model response for individual years particularly unusual years, is not very reliable and shows some large errors. The model is objective, adequate, timely, simple and not costly. It considers scientific knowledge on a broad scale but not in detail, and does not provide a good current measure of modeled yield reliability. Author

N83-16807*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
COMPARISON OF CEAS AND WILLIAMS-TYPE MODELS FOR SPRING WHEAT YIELDS IN NORTH DAKOTA AND MINNESOTA
T. L. Barnett, Principal Investigator Mar. 1982 62 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Proj. AgRISTARS)
(E83-10043; NASA-TM-85167; YM-U2-04289; JSC-18236; NAS 1.15:85167) Avail: NTIS HC A04/MF A01 CSCL 02C

The CEAS and Williams-type yield models are both based on multiple regression analysis of historical time series data at CRD level. The CEAS model develops a separate relation for each CRD; the Williams-type model pools CRD data to regional level (groups of similar CRDs). Basic variables considered in the analyses are USDA yield, monthly mean temperature, monthly precipitation, and variables derived from these. The Williams-type model also used soil texture and topographic information. Technological trend is represented in both by piecewise linear functions of year. Indicators of yield reliability obtained from a ten-year bootstrap test of each model (1970-1979) demonstrate that the models are

very similar in performance in all respects. Both models are about equally objective, adequate, timely, simple, and inexpensive. Both consider scientific knowledge on a broad scale but not in detail. Neither provides a good current measure of modeled yield reliability. The CEAS model is considered very slightly preferable for AgRISTARS applications. Author

N83-16808*# Department of Agriculture, Houston, Tex. Statistical Reporting Service.
A COMPARISON OF MEASURED AND ESTIMATED METEOROLOGICAL DATA FOR USE IN CROP GROWTH MODELING
Charles R. Perry, Jr., Julian L. Rogers, and Joe T. Ritchie Sep. 1982 5 p refs Presented at the Ann. Meeting of the Am. Statist. Assoc., Business and Econ. Statist. Sect., Cincinnati, 16-19 Aug. 1982 Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Proj. AgRISTARS)
(E83-10092; NASA-CR-16902; YM-J2-04359; JSC-18573; NAS 1.26:169602) Avail: NTIS HC A02/MF A01 CSCL 02C

Gridded spatial estimates of maximum-temperature, minimum temperature, precipitation, and solar radiation, prepared for agricultural use from World Meteorological Organization surface reports and enhanced by polar orbiting satellites were compared with daily meteorological data measured at various agricultural research facilities across the United States to determine their level of accuracy. Preliminary results indicate that daily maximum temperature can be determined to within 9.1 degrees Celsius with ninety percent confidence. With similar levels of confidence, daily minimum temperature can be determined to within 6.7 degrees Celsius, daily solar radiation to within 231.2 cal/sq cm min, and daily precipitation to within 9.7 millimeters. A.R.H.

N83-16809*# Rochester Inst. of Tech., N. Y. School of Photographic Arts and Sciences.
LANDSAT-D BAND 6 DATA EVALUATION Quarterly Report
15 Dec. 1982 2 p ERTS
(Contract NAS5-27323)
(E83-10130; NASA-CR-169758; NAS 1.26:169758; QR-1) Avail: NTIS HC A02/MF A01 CSCL 05B

A filter, fabricated to match the spectral response of the LANDSAT band 6 sensors, was received and the combined system response function computed. The half power points for the aircraft system are 10.5 micrometer and 11.55 micrometer compared to the 10.4 and 11.6 micrometer values for the satellite. These discrepancies are considered acceptable; their effect on the apparent temperature observed at the satellite is being evaluated. The filter was installed in the infrared line scanner and the line scanner was installed in the aircraft and field checked. A daytime underflight of the satellite is scheduled for the next clear overpass and the feasibility of a nightime overpass is being discussed with NASA. The LOWTRAN 5 computer code was obtained from the Air Force Geophysical Laboratory and is being implemented for use on this effort. A.R.H.

N83-16810*# California Univ., Santa Barbara. Dept. of Geography.
LANDSAT-D INVESTIGATIONS IN SNOW HYDROLOGY Quarterly Progress Report, 17 Nov. - 31 Dec. 1982
Jeff Dozier, Principal Investigator 31 Dec. 1982 4 p refs ERTS
(Contract NAS5-27463)
(E83-10131; NASA-CR-169759; NAS 1.26:169759) Avail: NTIS HC A02/MF A01 CSCL 08H

The sample LANDSAT-4 TM tape (7 bands) of NE Arkansas/Tennessee area was received and displayed. Snow reflectance in all 6 TM reflective bands, i.e. 1, 2, 3, 4, 5, and 7 was simulated, using Wiscombe and Warren's (1980) delta-Eddington model. Snow reflectance in bands 4, 5, and 7 appear sensitive to grain size. One of the objectives is to interpret surface optical grain size of snow, for spectral extension of albedo. While TM data of the study area are not received, simulation results are encouraging. It also appears that the TM filters resemble a 'square-wave' closely enough to permit assuming a square-wave in calculations. Integrated band reflectance over the actual response functions was simulated, using sensor data supplied by Santa Barbara Research Center. Differences between integrating over the actual response functions and the equivalent square wave were negligible. A.R.H.

N83-16811*# Texas Univ., El Paso. Dept. of Geological Sciences.
[APPLICATION OF MAGSAT TO LITHOSPHERIC MODELING IN SOUTH AMERICA] Quarterly Report, 1 Oct. - 31 Dec. 1982
G. R. Keller and E. G. Lidiak, Principal Investigators 31 Dec. 1982 1 p ERTS
(Contract NAS5-26326)
(E83-10132; NASA-CR-169760; NAS 1.26:169760) Avail: NTIS HC A02/MF A01 CSCL 05B

Progress continues on all aspects of the project. The prime emphasis is on the Rayleigh wave study and determination of both group and phase velocity dispersion is almost complete. Existing data sets were prepared for inversion. A paper on the relation of MAGSAT anomalies to the main tectonic provinces of South America was delivered at the annual meeting of the Society of Exploration Geophysicists. A.R.H.

N83-16812*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis Miss.
AN-A46: LANDSAT SCENE-TO-SCENE REGISTRATION ASSESSMENT
James E. Anderson, Principal Investigator 21 Jan. 1983 2 p ERTS
(E83-10137; NASA-TM-85198; NAS 1.15:85198) Avail: NTIS HC A02/MF A01 CSCL 05B

LANDSAT-4 MSS data and TM data for the 16 September 1982 scene were received. MSS data were reformatted and scene to scene registration, with previous MSS data is nearing completion. LANDSAT-2 to LANDSAT-2 MSS registration was completed. The results obtained serve as a baseline against which to compare the registrations containing LANDSAT-4 MSS. The TM data set as originally processed for the Orleans area had excessive yaw which exaggerated the forward/reverse scan pixal alignment, GSFC software was subsequently modified to minimize the problem. A detector stitching problem most pronounced in bodies of water was noted for TM channel 3 (0.63 micrometer to 0.69 micrometer). A.R.H.

N83-16813*# Department of Agriculture, Houston, Tex. Statistical Reporting Service.
IMPUTING HISTORICAL STATISTICS, SOILS INFORMATION, AND OTHER LAND-USE DATA TO CROP AREA
Charles R. Perry, Jr., Ronald W. Willis, and Lyle Lautenschlager Sep. 1982 5 p refs Presented at the Ann. Meeting of the Am. Statist. Assoc. Survey Res. Methods Sect., Cincinnati, 16-19 Aug. 1982 Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Proj. AgRISTARS)
(E83-10138; NASA-CR-169773; EW-J2-04358; JSC-18572; NAS 1.26:169773) Avail: NTIS HC A02/MF A01 CSCL 02C

In foreign crop condition monitoring, satellite acquired imagery is routinely used. To facilitate interpretation of this imagery, it is advantageous to have estimates of the crop types and their extent for small area units, i.e., grid cells on a map represent, at 60 deg latitude, an area nominally 25 by 25 nautical miles in size. The feasibility of imputing historical crop statistics, soils information, and other ancillary data to crop area for a province in Argentina is studied. Author

N83-16814*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROGRAM TO COMPUTE THE POSITIONS OF THE AIRCRAFT AND OF THE AIRCRAFT SENSOR FOOTPRINTS
Jack F. Paris, Principal Investigator Sep. 1982 20 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Proj. AgRISTARS)

(E83-10139; NASA-TM-85199; SR-J2-04360; JSC-18574; NAS 1.15:85199) Avail: NTIS HC A02/MF A01 CSCL 02C

The positions of the ground track of the aircraft and of the aircraft sensor footprints, in particular the metric camera and the radar scatterometer on the C-130 aircraft, are estimated by a program called ACTRK. The program uses the altitude, speed, and attitude informaton contained in the radar scatterometer data files to calculate the positions. The ACTRK program is documented. Author

N83-16815*# Environmental Research Inst. of Michigan, Ann Arbor. Applications Div.

LANDSAT TECHNOLOGY TRANSFER TO THE PRIVATE AND PUBLIC SECTORS THROUGH COMMUNITY COLLEGES AND OTHER LOCALLY AVAILABLE INSTITUTIONS, PHASE 2 PROGRAM Final Report, 6 Mar. 1981 - 6 Mar. 1982

Robert H. Rogers, Principal Investigator Mar. 1982 90 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Contract NAS5-26393)

(E83-10140; NASA-CR-170466; NAS 1.26:170466; ERIM-154700-1-F) Avail: NTIS HC A05/MF A01 CSCL 05A

A program established by NASA with the Environmental Research Institute of Michigan (ERIM) applies a network where the major participants are NASA, universities or research institutes, community colleges, and local private and public organizations. Local users are given an opportunity to obtain 'hands on' training in LANDSAT data analysis and Geographic Information System (GIS) techniques using a desk top, interactive remote analysis station (RAS). The RAS communicates with a central computing facility via telephone line, and provides for generation of land use and land suitability maps and other data products via remote command. During the period from 22 September 1980 - 6 March 1982, 15 workshops and other training activities were successfully conducted throughout Michigan providing hands on training on the RAS terminals for 250 or more people and user awareness activities such as exhibits and demontrations for 2,000 or more participants. A.R.H.

N83-16816*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.

AUTOMATIC SEGMENT MATCHING ALGORITHM THEORY, TEST AND EVALUATION

M. T. Kalcic, Principal Investigator Jun. 1982 46 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Proj. AgRISTARS)

(E83-10141; NASA-TM-85200; DC-Y2-04325; NSTL/ERL-209; NAS 1.15:85200) Avail: NTIS HC A03/MF A01 CSCL 02C

Currently, an initial registration of sample segment data to raw LANDSAT data is obtained using a least-squares fit based on selected control points. The initial registration gives an adequate fit on a global basis, but on a local basis more precision can be obtained. The USDA/SRS presently accomplishes this by manually shifting the segments in the locality of the initial gross registration until a 'good' fit can be visually detected. An algorithm that would automate process of segment shifting is presented. A.R.H.

N83-16817*# Maryland Univ., College Park. Remote Sensing Systems Lab.

A MODEL FOR ESTIMATING TIME-VARIANT RAINFALL INFILTRATION AS A FUNCTION OF ANTECEDENT SURFACE MOISTURE AND HYDROLOGIC SOIL TYPE

H. A. Wilkening and R. M. Ragan Oct. 1982 86 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS

(Proj. AgRISTARS)

(E83-10142; NASA-CR-169776; CP-52-04372; NAS 1.26:169776) Avail: NTIS HC A05/MF A01 CSCL 02C

Recent research indicates that the use of remote sensing techniques for the measurement of near surface soil moisture could be practical in the not too distant future. Other research shows that infiltration rates, especially for average or frequent rainfall events, are extremely sensitive to the proper definition and consideration of the role of the soil moisture at the beginning of the rainfall. Thus, it is important that an easy to use, but theoretically sound, rainfall infiltration model be available if the anticipated remotely sensed soil moisture data is to be optimally utilized for hydrologic simulation. A series of numerical experiments with the Richards' equation for an array of conditions anticipated in watershed hydrology were used to develop functional relationships that describe temporal infiltration rates as a function of soil type and initial moisture conditions. Author

N83-16818*# Missouri Univ., Columbia. Dept. of Atmospheric Science.

EVALUATION OF THE CEAS TREND AND MONTHLY WEATHER DATA MODELS FOR SOYBEAN YIELDS IN IOWA, ILLINOIS, AND INDIANA

Vikki French, Principal Investigator Oct. 1982 77 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS

(Proj. AgRISTARS)

(E83-10143; NASA-CR-169765; YM-12-04364; JSC-18575; NAS 1.26:169765) Avail: NTIS HC A05/MF A01 CSCL 02C

The CEAS models evaluated use historic trend and meteorological and agroclimatic variables to forecast soybean yields in Iowa, Illinois, and Indiana. Indicators of yield reliability and current measures of modeled yield reliability were obtained from bootstrap tests on the end of season models. Indicators of yield reliability show that the state models are consistently better than the crop reporting district (CRD) models. One CRD model is especially poor. At the state level, the bias of each model is less than one half quintal/hectare. The standard deviation is between one and two quintals/hectare. The models are adequate in terms of coverage and are to a certain extent consistent with scientific knowledge. Timely yield estimates can be made during the growing season using truncated models. The models are easy to understand and use and are not costly to operate. Other than the specification of values used to determine evapotranspiration, the models are objective. Because the method of variable selection used in the model development is adequately documented, no evaluation can be made of the objectivity and cost of redevelopment of the model. Author

N83-16819*# Purdue Univ., Lafayette, Ind. Lab. for the Applications of Remote Sensing.

EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Report, 1 Jun. - 31 Aug. 1979

Roger M. Hoffer, Principal Investigator 31 Aug. 1979 28 p refs ERTS

(Contract NAS9-15889)

(E83-10144; NASA-CR-167787; NAS 1.26:167787; LARS-CR-083179) Avail: NTIS HC A03/MF A01 CSCL 02F

A literature review on radar and spectral band information was conducted and a NC-130 mission was flown carrying the NS001 scanner system which basically corresponds to the channel configuration of the proposed thematic mapper. Aerial photography and other reference data were obtained for the study site, an area approximately 290 sq miles in north central South Carolina. A cover type map was prepared and methods were devised for reformatting and geometrically correcting MSS CRT data. Arrangements were made to obtain LANDSAT data for dates approximating the NC-130 mission. Because of the waveband employed to obtain SEASAT radar data, it was decided to determine if X-band (2.40 cm to 3.75 cm wavelength) imagery is available. A.R.H.

N83-16820*# Purdue Univ., Lafayette, Ind. Lab. for the Applications of Remote Sensing.

EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Sep. -

30 Nov. 1979
Roger M. Hoffer, Principal Investigator 30 Nov. 1979 29 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15889)
(E83-10145; NASA-CR-167788; NAS 1.26:167788;
LARS-CR-120379) Avail: NTIS HC A03/MF A01 CSCL 02C

The spatial characteristics of the data were evaluated. A program was developed to reduce the spatial distortions resulting from variable viewing distance, and geometrically adjusted data sets were generated. The potential need for some level of radiometric adjustment was evidenced by an along track band of high reflectance across different cover types in the Varian imagery. A multiple regression analysis was employed to explore the viewing angle effect on measured reflectance. Areas in the data set which appeared to have no across track stratification of cover type were identified. A program was developed which computed the average reflectance by column for each channel, over all of the scan lines in the designated areas. A regression analysis was then run using the first, second, and third degree polynomials, for each channel. An atmospheric effect as a component of the viewing angle source of variance is discussed. Cover type maps were completed and training and test field selection was initiated.
A.R.H.

N83-16821*# Purdue Univ., Lafayette, Ind. Lab. for the Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Dec. 1979 - 29 Feb. 1980
Roger M. Hoffer, Principal Investigator 29 Feb. 1980 6 p ERTS
(Contract NAS9-15889)
(E83-10146; NASA-CR-167789; NAS 1.26:167789;
LARS-CR-022680) Avail: NTIS HC A02/MF A01 CSCL 02F

The column normalizing technique was used to adjust the data for variations in the amplitude of the signal due to look angle effects with respect to solar zenith angle along the scan lines (i.e., across columns). Evaluation of the data set containing the geometric and radiometric adjustments, indicates that the data set should be satisfactory for further processing and analysis. Software was developed for degrading the spatial resolution of the aircraft data to produce a total of four data sets for further analysis. The quality of LANDSAT 2 CCT data for the test site is good for channels four, five, and six. Channel seven was not present on the tape. The data received were reformatted and analysis of the test site area was initiated. A.R.H.

N83-16822*# Purdue Univ., Lafayette, Ind. Lab. for the Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Mar. - 31 May 1980
Roger M. Hoffer, Principal Investigator 31 May 1980 13 p refs ERTS
(Contract NAS9-15889)
(E83-10147; NASA-CR-167790; NAS 1.26:167790;
LARS-CR-060780) Avail: NTIS HC A02/MF A01 CSCL 02F

Several possibilities were considered for defining the data set in which the same test areas could be used for each of the four different spatial resolutions being evaluated. The LARSYS CLUSTER was used to sort the vectors into spectral classes to reduce the within-spectral class variability in an effort to develop training statistics. A data quality test was written to determine the basic signal to noise characteristics within the data set being used. Because preliminary analysis of the LANDSAT MSS data revealed the presence of high cirrus clouds, other data sets are being sought. A.R.H.

N83-16823*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Jun. - 31 Aug. 1980
Roger M. Hoffer, Principal Investigator, R. S. Latty, E. Dean, and D. J. Knowlton 31 Aug. 1980 57 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15889)
(E83-10148; NASA-CR-167791; NAS 1.26:167791;
LARS-CR-083080) Avail: NTIS HC A04/MF A01 CSCL 02F

Separate holograms of horizontally (HH) and vertically (HV) polarized responses obtained by the APQ-102 side-looking radar were processed through an optical correlator and the resulting image was recorded on positive film from which black and white negative and positive prints were made. Visual comparison of the HH and HV images reveals a distinct dark band in the imagery which covers about 30% of the radar strip. Preliminary evaluaton of the flight line 1 date indicates that various features on the HH and HV images seem to have different response levels. The amount of sidelap due to the look angle between flight lines 1 and 2 is negligible. NASA mission #425 to obtain flightlines of NS-001 MSS data and supporting aerial photography was successfully flown. Flight line 3 data are of very good quality and virtually cloud-free. Results of data analysis for selection of test fields and for evaluation of waveband combination and spatial resolution are presented.
A.R.H.

N83-16824*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Sep. - 30 Nov. 1980
Roger M. Hoffer, Principal Investigator 30 Nov. 1980 21 p ERTS
(Contract NAS9-15889)
(E83-10149; NASA-CR-167792; NAS 1.26:167792;
LARS-CR-120180) Avail: NTIS HC A02/MF A01 CSCL 02F

To facilitate comparison between the four different spatial resolution of the NS-001 MSS data sets, a supervised approach was taken in defining training blocks for each of the different cover types. The training fields representing each cover type category were grouped and this group was clustered to determine the individual spectral classes within each cover type category which would effectively characterize the entire test site. Graphs show the variation in spectral response level with respect to distance in the across track dimension for four sampling intervals. Radar digitization procedures were developd. Flight characteristics and parameters for digitization of radar imagery are tabulated. The statement of work for phase 3 was reviewed and modifications were suggested to meet funding reduction. A.R.H.

N83-16825*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Dec. 1980 - 28 Feb. 1981
Roger M. Hoffer, Principal Investigator 28 Feb. 1981 21 p Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15889)
(E83-10150; NASA-CR-167793; NAS 1.26:167793;
LARS-CR-022681) Avail: NTIS HC A02/MF A01 CSCL 02F

Training and test data sets for CAM1S from NS-001 MSS data for two dates (geometrically adjusted to 30 meter resolution) were used to evaluate wavelength band. Two sets of tapes containing digitized HH and HV polarization data were obtained. Because the SAR data on the 9 track tapes contained no meaningful data, the 7 track tapes were copied onto 9 track tapes at LARS. The LARSYS programs were modified and a program was written to reformat the digitized SAR data into a LARSYS format. The radar imagery is being qualitatively interpreted. Results

are to be used to identify possible cover types, to produce a classification map to aid in the numerical evaluation classification of radar data, and to develop an interpretation key for radar imagery. The four spatial resolution data sets were analyzed. A program was developed to reduce the spatial distortions resulting from variable viewing distance, and geometrically adjusted data sets were generated. A flowchart of steps taken to geomtrically adjust a data set from the NS-001 scanner is presented. A.R.H.

N83-16826*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.

EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Mar. - 31 May 1981

Roger M. Hoffer, Principal Investigator, D. J. Knowlton, and M. E. Dean 31 May 1981 33 p Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Contract NAS9-15889)

(E83-10151; NASA-CR-167794; NAS 1.26:167794; LARS-CR-053181) Avail: NTIS HC A03/MF A01 CSCL 02F

A set of training statistics for the 30 meter resolution simulated thematic mapper MSS data was generated based on land use/land cover classes. In addition to this supervised data set, a nonsupervised multicluster block of training statistics is being defined in order to compare the classification results and evaluate the effect of the different training selection methods on classification performance. Two test data sets, defined using a stratified sampling procedure incorporating a grid system with dimensions of 50 lines by 50 columns, and another set based on an analyst supervised set of test fields were used to evaluate the classifications of the TMS data. The supervised training data set generated training statistics, and a per point Gaussian maximum likelihood classification of the 1979 TMS data was obtained. The August 1980 MSS data was radiometrically adjusted. The SAR data was redigitized and the SAR imagery was qualitatively analyzed. A.R.H.

N83-16827*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.

EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Jun. - 31 Aug. 1981

Roger M. Hoffer, Principal Investigator, D. J. Knowlton, and M. E. Dean 31 Aug. 1981 27 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Contract NAS9-15889)

(E83-10152; NASA-CR-167795; NAS 1.26:167795; LARS-CR-082981) Avail: NTIS HC A03/MF A01 CSCL 02F

Supervised and cluster block training statistics were used to analyze the thematic mapper simulation MSS data (both 1979 and 1980 data sets). Cover information classes identified on SAR imagery include: hardwood, pine, mixed pine hardwood, clearcut, pasture, crops, emergent crops, bare soil, urban, and water. Preliminary analysis of the HH and HV polarized SAR data indicate a high variance associated with each information class except for water and bare soil. The large variance for most spectral classes suggests that while the means might be statistically separable, an overlap may exist between the classes which could introduce a significant classification error. The quantitative values of many cover types are much larger on the HV polarization than on the HH, thereby indicating the relative nature of the digitized data values. The mean values of the spectral classes in the areas with larger look angles are greater than the means of the same cover type in other areas having steeper look angles. Difficulty in accurately overlaying the dual polarization of the SAR data was resolved. A.R.H.

N83-16828*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.

EVALUATION OF SLAR AND SIMULATED THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Final Report

R. M. Hoffer, M. E. Dean, D. J. Knowlton, and R. S. Latty 1982 284 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Contract NAS9-15889)

(E83-10153; NASA-CR-167796; NAS 1.26:167796; LARS-TR-083182) Avail: NTIS HC A13/MF A01 CSCL 02F

Kershaw County, South Carolina was selected as the study site for analyzing simulated thematic mapper MSS data and dual-polarized X-band synthetic aperture radar (SAR) data. The impact of the improved spatial and spectral characteristics of the LANDSAT D thematic mapper data on computer aided analysis for forest cover type mapping was examined as well as the value of synthetic aperture radar data for differentiating forest and other cover types. The utility of pattern recognition techniques for analyzing SAR data was assessed. Topics covered include: (1) collection and of TMS and reference data; (2) reformatting, geometric and radiometric rectification, and spatial resolution degradation of TMS data; (3) development of training statistics and test data sets; (4) evaluation of different numbers and combinations of wavelength bands on classification performance; (5) comparison among three classification algorithms; and (6) the effectiveness of the principal component transformation in data analysis. The collection, digitization, reformatting, and geometric adjustment of SAR data are also discussed. Image interpretation results and classification results are presented. A.R.H.

N83-16829*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

A SEASAT REPORT. VOLUME 1: PROGRAM SUMMARY Final Report

E. Pounder, ed. 15 Sep. 1980 223 p refs

(NASA-CR-169787; JPL-Pub-80-38-Vol-1; NAS 1.26:169787) Avail: NTIS HC A10/MF A01 CSCL 22B

The program background and experiment objectives are summarized, and a description of the organization and interfaces of the project are provided. The mission plan and history are also included as well as user activities and a brief description of the data system. A financial and manpower summary and preliminary results of the mission are also included. S.L.

N83-16830*# OAO Corp., Greenbelt, Md.

NASA GEODYNAMICS PROGRAM INVESTIGATIONS SUMMARIES: A SUPPLEMENT TO THE NASA GEODYNAMICS PROGRAM OVERVIEW Final Report

12 Nov. 1982 108 p

(Contract NASw-3358)

(NASA-CR-169774; NAS 1.26:169774) Avail: NTIS HC A06/MF A01 CSCL 08B

The development of a time series of global atmospheric motion and mass fields through April 1984 to compare with changes in length of day and polar motion was investigated. Earth rotation was studied and the following topics are discussed: (1) computation of atmospheric angular momentum through April 1984; (2) comparisons of psi sub values with variations in length of day obtained by several groups utilizing B.I.H., lunar laser ranging, VLBI, or Lageos measurements; (3) computation of atmospheric excitation of polar motion using daily fields of atmospheric winds and pressures for a short test period. Daily calculations may be extended over a longer period to examine the forcing of the annual and Chandler wobbles, in addition to higher frequency nutations. E.A.K.

N83-16831*# National Aeronautics and Space Administration, Washington, D. C.

SPACE FRAGMENT IN STUDIES OF THE EARTH

G. A. Avanesov and Ya. L. Ziman Oct. 1982 17 p Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 4, Jul. - Aug. 1982 p 6-12 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-77155; NAS 1.15:77155) Avail: NTIS HC A02/MF A01 CSCL 14B

The fragment apparatus, mounted on board the artificial earth satellite Meteor, was created for the operational study of the natural resources of the Earth in the optical range of electromagnetic waves. The orbit of the satellite at an altitude of about 650 km makes it possible to observe the same sectors of the Earth's surface at the same time of day with a periodicity of 15 days.

Author

N83-16832# Case Inst. of Tech., Cleveland, Ohio. Center for Large Scale Systems and Policy Analysis.

ADVANCED CALIBRATION METHODOLOGY FOR HYDROLOGIC RAINFALL-RUNOFF SIMULATION MODELS

Soroosh Sorooshian Dec. 1981 163 p refs

(Contract DI-14-34-0001-9442)

(PB82-256603; LSSPA-81-6; W82-06366; OWRT-C90320-G(9442)(2)) Avail: NTIS HC A08/MF A01 CSCL 08H

Stochastic estimation techniques are presented which are capable of improving hydrologic conceptual rainfall-runoff model calibrations by accounting for streamflow measurement uncertainties (and other, additive, errors). Specifically, the auto-correlated and the heteroscedastic (changing variance) error cases are considered. The methods are shown to perform well in simulation studies, and application of the techniques to the calibration of the U.S. National Weather Services soil moisture accounting model showed superiority of the new procedures over the commonly used simple least squares criterion. The procedures were compared under different data conditions and starting parameters values. Results indicate important phenomena needing study and accountability. Author (GRA)

N83-16833# Oak Ridge National Lab., Tenn.

ALPHA-BETA-GAMMA SPECTROMETER AS AN AID IN DIRECTING DECONTAMINATION OF SOILS

C. D. Berger 1981 7 p refs Presented at the Am. Nucl. Soc. Winter Meeting, San Francisco, 29 Nov. 4 Dec. 1981

(Contract W-7405-eng-26)

(DE82-004122; CONF-811103-54) Avail: NTIS HC A02/MF A01

This technique permits rapid assessment of alpha-beta-gamma-emitter contamination in soils at sufficiently low concentrations to direct field operations. Of particular importance is is applicability during initial decommissioning and decontamination surveys when characterization of alpha and beta contamination in the presence of a high gamma background is necessary. This system has not yet been made portable for in-situ use, but it is expected that results will be favorable when operated as a field instrument, resulting in simplified standard decontamination operation. DOE

N83-16834# Florida Inst. of Tech., Melbourne. Space Technology Program.

ADVANCED THERMAL-SENSOR-SYSTEM DEVELOPMENT VIA SHUTTLE SORTIE MISSIONS

Joseph A. Angelo, Jr. and Irving W. Ginsberg (Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev.) 1981 31 p refs Presented at the 4th Intern. Conf. on Alternative Energy Sources, Miami Beach, Fla., 14 dec. 1981

(Contract DE-AC08-76NV-01183)

(DE82-004932; EGG-1183-1785; CONF-811212-4) Avail: NTIS HC A03/MF A01

The use of the space shuttle in various sortie mission modes to evaluate advanced thermal sensor system concepts, prior to a design commitment for automated spacecraft application, is described. Selected terrestrial energy sources of civilian and/or military interest are examined with respect to: (1) thermal source location and characterization and (2) temperature and emissivity measurements. Of particular interest is the application of on orbit sensor testing to demonstrate the location and characterization of potential geothermal energy resources. The role of the payload specialist in thermal source location, sensor operation and real time evaluation of mission performance is discussed. DOE

N83-16835# Pacific Northwest Lab., Richland, Wash.

ISOLATION OF METALLIC COMPLEXES IN SHALE OIL AND SHALE OIL RETORT WATERS

K. B. Olsen, A. P. Toste, and D. J. Hayes 1981 15 p refs Presented at DOE/NBS Workshop on Environ. Speciation and Monitoring Needs, Gaithersburg, Md., 18-20 May 1981

(Contract DE-AC06-76RL-01830)

(DE82-005931; PNL-SA-9394; CONF-810588-6) Avail: NTIS HC A02/MF A01

Methods applied to the fractionation of trace metals in shale oil by silica gel and alumina chromatography and the fractionation of retort waters by C18 partition chromatography are described. Direct current plasma emission spectroscopy was used to analyze Fe, Ni, Cu and Mo in the oils and B, Zn, Mo, Fe and Mn in the waters (INAA) was determined. Arsenic in the oils Instrumental neutron activation analysis. In the silica gel separation most of the metals eluted in two fractions corresponding to the moderately polar and highly polar fractions of the oil. Nickel eluted in the slightly polar fraction of the oils. Further separation of the nickel enriched fraction on alumina yielded a fraction rich in nickel-porphyrin type compounds. Following C18 Sep-pak fractionation of the retort waters, boron and manganese remained associated with the aqueous, or hydrophilic, fraction. Portions of the zinc, molybdenum and iron partitioned in the hydrophobic organic fraction of the retort waters. DOE

N83-16836# California Univ., Livermore. Lawrence Livermore Lab. Research School of Earth Sciences.

INVESTIGATIONS ON SYNROC MINERALOGY Progress Report

A. E. Ringwood Livermore, Calif. California Univ., Lawrence Livermore Lab. 21 Jan. 1982 97 p refs

(Contract W-7405-eng-48)

(DE82-011072; UCRL-15436) Avail: NTIS HC A05/MF A01

Progress reports are presented for the following projects: (1) factors influencing the leaching performance of hollandiate; (2) incorporation of uranium and rare earths into zirconolite; (3) reconnaissance studies of the stability relations of Ca-Ti-Al phases in SYNROC C formulations; (4) immobilization of highly aluminous sludges; (5) SYNROC D formulations produced by sintering in air; (6) crystallization behavior of interstitial glass in SYNROC D formulations. Some of the highlights are: (1) leaching performance of all hollandities irrespective of preparation technique, can be improved by hot-pressing under specific controlled redox conditions, below Ni-NiO; (2) there is no satisfactory crystal-chemical reason why the leaching performance of Ti3(+)-bearing hollandite should be superior to that of Al3(+) hollandite; and (3) experiments have shown that the zirconolite lattice can accept up to 30% rare earths (Sm_2O_3) before becoming destabilized in favor of pyrochlore or a related f.c.c. structure. DOE

N83-16837# California Univ., Livermore. Lawrence Livermore Lab.

OIL SHALE PROJECT RUN SUMMARY SMALL RETORT RUN S-7

F. J. Ackerman, W. A. Sandholtz, W. C. Miller, and A. B. Casamajor 11 Dec. 1981 50 p refs

(Contract W-7405-eng-48)

(DE82-004731; UCID-19275) Avail: NTIS HC A03/MF A01

Retort Run S-7 was a combustion run in the small retort conducted on October 10-11, 1975. Nitrogen was used to dilute the inlet air to 7.5% oxygen. Gas analysis shows that oil was not burned, but the oil yield was only 78%. If the oil yield was actually 90% and 1.3 kg of oil was lost up the stack, the mass balance would show a small improvement, 1.2 kg (approx 0.5%) unaccounted for, the energy balance would have only 1% energy unaccounted for, and the carbon balance would be improved from 10.5% to 1.4% loss. DOE

N83-16838# Bendix Field Engineering Corp., Grand Junction, Colo.

SURVEY OF LANDS HELD FOR URANIUM EXPLORATION, DEVELOPMENT AND PRODUCTION IN FOURTEEN WESTERN STATES FOR THE SIX-MONTH PERIOD ENDING JUNE 30, 1981

Nov. 1981 23 p
(Contract DE-AC13-76GJ-01664)
(DE82-006228; GJBX-413-81) Avail: NTIS HC A02/MF A01

Land ownership statistics relative to uranium exploration in fourteen western states are given in tabular form. The statistics set forth for the period covered are based on data gathered from records available to the public. The county records of mining claim locations, reports of state and Federal land offices, and commercial reporting services furnished the data. DOE

N83-16839# Intercomp Resources Development and Engineering Corp., Denver, Colo.
RESERVOIR ENGINEERING TRANSIENT PRESSURE WELL TESTING, AND PETROPHYSICAL ANALYSES OF WESTERN GAS SANDS Annual Report, Jul. 1978 - Aug. 1979
Harold C. Bixel, James H. Kennedy, and John E. McElhiney Bartlesville, Okla. DOE Nov. 1981 171 p refs
(Contracts DE-AC19-79BC-10106; ET-78-C-08-1557)
(DE82-004879; DOE/BC-10106-26) Avail: NTIS HC A08/MF A01

Improvement in gas deliverability by massive hydraulic fracturing of low permeability Western Gas Sands has been generally disappointing. This investigation uses petrophysical studies, transient pressure analysis of well performance, and parametric study of various fracture properties to aid in the understanding of the results of several DOE cost-shared MHF treatments. Both the transient pressure analysis and the parametric study utilize numerical simulation techniques. A generalized approach to pressure buildup analyses of tests with short flow periods is developed. The parametric analyses are focused on those variable of MHF treatments over which the operator and engineer have some control. Improvements in pressure measurement techniques are suggested as well as reasons why MHF treatments have had limited success. DOE

N83-16840# CER Corp., Las Vegas, Nev.
WESTERN GAS SANDS PROJECT Status Report, Apr.- Jun. 1981
1981 142 p refs
(Contract DE-AC08-79BC-10003)
(DE82-004509; DOE/BC-10003-24) Avail: NTIS HC A07/MF A01

During the quarter, CK GeoEnergy field work on the outcrop analysis in the Rifle Gap area of Colorado was begun. Activities for the Multi-Well Experiment centered upon site acquisition, experiment planning and preparation, limited field activities, and analysis and evaluation. In Bartlesville Energy Technology Center's Reservoir Simulator Studies, development and refinement of the 2D and 3D lenticular reservoir/well simulator programs continued. Lawrence Livermore National Laboratory has continued developing their codes to model fluid flow and pressure evolution in an expanding crack; efforts during the quarter have been directed toward the solution of a calculational instability, which develops when a constant pressure inlet boundary condition is imposed. At Los Alamos National Laboratory, effort was focused on two main areas: (1) field mapping of the double Helmholtz coil pair and (2) NMR T sub 1 relaxation measurements were carried out on a set of artificial ceramic rock samples to investigate the effect of pore size on the NMR relaxation rate. DOE

N83-16841# California Univ., Berkeley. Dept. of Chemical Engineering.
LINEAR OIL DISPLACEMENT BY THE EMULSION ENTRAPMENT PROCESS M.S. Thesis
David Paul Schmidt Berkeley, Calif. California Univ., Lawrence Berkeley Lab. Jan. 1982 166 p refs
(Contract W-7405-eng-48)
(DE82-007751; LBL-13905) Avail: NTIS HC A08/MF A01

Lack of mobility control is one of the major impediments to successful enhanced oil recovery, especially for high viscosity oils. This work presents experimental and theoretical results for linear secondary oil displacements using dilute, stable suspensions of oil drops. The major hypothesis is that emulsions provide mobility control through entrapment or local permeability reduction, not through viscosity ratio improvement. In order to describe the displacement process, previous emulsion filtration theory is extended to longer cores and to two-phase flow. Quantitative agreement between theory and experiment is satisfactory for continuous secondary oil displacement with various drop-size emulsions in unconsolidated sand packs of permeabilities ranging from 0.7 sq micrometers to 3.3 sq micrometers. Linear emulsion floods are shown to be most effective when the mean drop-size to pore-size ratio is in the region between straining and interception at the emulsion shock. Floods are more effective when the emulsion concentration is high which minimizes retention lag. DOE

N83-16842# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE LIVENGOOD NTMS QUADRANGLE, ALASKA
S. L. Langfeldt, comp., L. C. Hardy, comp., R. F. DAndrea, Jr., comp., R. J. Zinkl, comp., D. L. Shettel, Jr., comp., W. K. Hensley, G. J. Thomas, C. J. Martell, and L. W. Maassen Jan. 1982 32 p refs Prepared in cooperation with Los Alamos National Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009662; GJBX-2-82) Avail: NTIS HC A03/MF A01

Results of a hydrogeochemical and Stream Sediment Reconnaissance of the Livengood NTMS Quadrangle, Alaska are given. Presented are location data, field analyses, and laboratory analyses of several different sample media. The data were subdivided into groups of stream-water and lake-water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements were included. DOE

N83-16843# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE BARROW NTMS QUADRANGLE, ALASKA
D. L. Shettel, Jr., comp., S. L. Langfeldt, comp., L. C. Hardy, comp., R. F. DAndrea, Jr., comp., R. J. Zinkl, comp., S. R. Garcia, D. Hanks, W. E. George, and S. L. Bolivar Jan. 1982 17 p refs Prepared in cooperation with Los Alamos National Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009665; GJBX-5-82) Avail: NTIS HC A02/MF A01

Results of a Hydrogeochemical and Stream Sediment Reconnaissance of the Barrow NTMS quadrangle, Alaska are given. The data were subdivided into lake sediment samples. DOE

N83-16844# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE ST. MICHAEL NTMS QUADRANGLE, ALASKA
L. C. Hardy, comp., R. F. DAndrea, Jr., comp., R. J. Zinkl, comp., D. L. Shettel, Jr., comp., S. L. Langfeldt, comp., S. R. Garcia, D. Hanks, W. E. George, and S. L. Bolivar Jan. 1982 41 p refs Prepared in cooperation with Los Alamos National Lab.
(Contract DE-AC13-76G-01664)
(DE82-009999; GJBX-20-82) Avail: NTIS HC A03/MF A01

Results of a Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) of the St. Michael NTMS Quadrangle, Alaska are presented. Presented are location data, field analyses, and laboratory analyses of several different sample media. The analytical results for each medium are summarized. The data are into groups of steam sediment and lake sediment samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements and maps showing results of multivariate statistical analyses are included. DOE

N83-16845# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE COLEEN NTMS QUADRANGLE, ALASKA
S. L. Langfeldt, comp., L. C. Hardy, comp., R. F. DAndrea, Jr.,

comp., R. J. Zinkl, comp., D. L. Shettel, Jr., comp., S. R. Garcia, D. Hanks, W. E. George, and S. L. Bolivar Feb. 1982 95 p refs Prepared in cooperation with Los Alamos National Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009650; GJBX-12-82) Avail: NTIS HC A05/MF A01

Results of a Hydrogeochemical and Stream Sediment Reconnaissance of the Coleen NTMS Quadrangle, Alaska are given. Presented are location data, field analyses, and laboratory analyses of several different sample media. The sample media are discribed and the analytical results for each medium are summarized. The data was subdivided into groups of stream-sediment and lake-sediment samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements are included. Also included are maps showing results of multivariate statistical analyses. DOE

N83-16846# National Ocean Survey, Rockville, Md. Office of Program Development and Management.
NATIONAL OCEAN SURVEY REPORT: FISCAL 1980
Oct. 1981 99 p refs
(PB83-101246; NOAA-81121703) Avail: NTIS HC A05/MF A01 CSCL 08F

The activities of the National Ocean Survey are discussed. Hydrology, mapping, project management, research facilities, and marine technology are among the topics considered. GRA

N83-16847# Geological Survey, Reston, Va.
BALANCE: A COMPUTER PROGRAM FOR CALCULATING MASS TRANSFER FOR GEOCHEMICAL REACTIONS IN GROUND WATER Final Report
David L. Parkhurst, L. Niel Plummer, and Donald C. Thorstenson Feb. 1982 35 p refs
(PB82-255902; USGS/WRD/WRI/82-060; USGS/WRI-82-14) Avail: NTIS HC A03/MF A01 CSCL 08D

BALANCE is a FORTRAN computer program designed to define and quantify chemical reactions between ground water and minerals. Using the chemical compositions of water samples from two points along a flow path and a set of mineral phases hypothesized to be the reactive constituents in the system, the program calculates the mass transfer (amounts of the phases entering or leaving the aqueous phase) necessary to account for the observed changes in composition between the two water samples. Additional constraints can be included in the problem formulation to account for mixing of two end member waters, redox reactions, and in a simplified form, isotopic composition. The computer code and a description of the input necessary to run the program are presented. Three examples typical of ground water systems are described. Author (GRA)

N83-16848# National Ocean Survey, Rockville, Md.
ESTABLISHMENT OF CALIBRATION BASE LINES, REVISED
Paul R. Spofford, Joseph F. Dracup, C. J. Fronczek, and R. Tomlinson Jun. 1982 27 p refs
(PB82-252370; NOAA-82070901; NOAA-TM-NOS-NGS-8) Avail: NTIS HC A03/MF A01 CSCL 08E

The calibration of electronic distance measuring instruments involves the determination or verification constants and the assurance that the measured distances meet accuracy specifications. Although it is not necessary to use a measured distance to determine or verify instrument constants, the verification effort is reduced when an accurately measured distance can be used. However, to assure that the measuring capabilities of an instrument have not significantly deteriorated, a known distance of high accuracy or, preferably, a sequence of distances forming a calibration range or base line is required. Experience shows that a base line consisting of four one line monuments spaced at intervals of 150 m, 400 to 430 m, and 1000 to 1400 m will meet the needs of most users. Specifications and recommended procedures for establishing calibration base lines are described in detail. Author (GRA)

N83-16849# Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
OPTIMIZING THE EVALUATION OF LAKE WATER QUALITY THROUGH ANALYSIS OF EXISTING REMOTELY SENSED DATA Technical Completion Report, Oct. 1980 - Sep. 1981
W. R. Philipson, K. Kozai, and E. L. Mills Dec. 1981 37 p refs
(Contract DI-14-34-0001-1134)
(PB82-256637; W82-06370; OWRT-A-091-NY(1)) Avail: NTIS HC A03/MF A01 CSCL 08H

A methodology development was undertaken for use in selecting optimum sampling locations for water quality assessment in a large eutrophic New York State lake (Oneida Lake). The methodology approach was based on the premises that LANDSAT satellite image densities can be modeled, and that homogeneous water quality areas could be thereby predicted. Patterns of Lake density on 24 LANDSAT band-5 images (0.6-0.7 microns) were traced from a density-slicer screen, following standardization of the color assignments with dark- and a light-toned feature. Cell density levels were then used as the dependent variable in correlations and multiple regressions with degree days, and resultant wind speed and direction. Further, equation-predicted density levels in selected cells were correlated with measured values of chlorophyll-a, chlorophyll-a plus pheophytin, and Secchi disk transparency. Author (GRA)

N83-16850# National Oceanic and Atmospheric Administration, Washington, D. C. Office of Ocean Minerals and Energy.
DEEP SEABED MINING: MARINE ENVIRONMENTAL RESEARCH PLAN, 1981 - 1985
Jun. 1982 147 p refs
(PB82-258054; NOAA-82073004) Avail: NTIS HC A07/MF A01 CSCL 08I

Although the specific technologies and methods to be used in deep seatbed mining are still under development, a generalized scheme for the mining operations can be predicted. This Five Year Research Plan, prepared in response to the Congressional mandate, addresses scientific needs for Fiscal Year 1981-85 relating to the potential environmental effects from mining and at sea disposal of processing wastes. Studies of potential land impacts from onshore nodule processing and waste disposal are considered beyond the scope of this document. GRA

N83-16851# National Geodetic Survey, Rockville, Md.
CORRECTIONS APPLIED BY THE NATIONAL GEODETIC SURVEY TO PRECISE LEVELING OBSERVATIONS
Emery I. Balazs and Gary M. Young Jun. 1982 18 p refs
(PB82-253709; NOAA-TM-NOS-NGS-34; NOAA-82072302) Avail: NTIS HC A02/MF A01 CSCL 08B

The six corrections applied by the National Geodetic Survey to precise leveling observations are described. These corrections are applied to observed leveling data to minimize the effects of known systematic errors. The rod scale correction ensures a uniform scale which conforms to the National length standard. The rod temperature correction accounts for variation in the length of the leveling rod's Invar/LO-VAR strip which results from temperature changes. The level collimation correction minimizes the error caused by nonhorizontality of the leveling instrument's line of sight for unequal sight lengths. The refraction correction is modeling to minimize the refraction error caused by temperature (density) variation of air strata. The astronomic correction counteracts the effects of the Moon and Sun on the equipotential surfaces of the Earth. Author (GRA)

N83-16852# National Academy of Sciences - National Research Council, Washington, D. C. Polar Research Board.
POLAR RESEARCH BOARD REPORT AND FUTURE PLANS Annual Report, Jan. - Dec. 1981
1982 59 p refs
(PB82-263344) Avail: NTIS HC A04/MF A01 CSCL 08L

Studies completed, work in progress, and projects planned for initiation in the coming year in polar research are discussed. Ecosystems, the upper atmosphere, glaciology, and permafrost are among the topics discussed. International activities related to the Polar Research Board's role as U.S. National Committee for

the Scientific Committee on Antarctic Research of the International Council of Scientific Unions are also described. GRA

N83-16853# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
A PROCEDURES MANUAL FOR USING HIGH-ALTITUDE PANORAMIC PHOTOGRAPHY FOR FOREST PEST DAMAGE SURVEYS
R. D. Dillman, B. B. Eav, and S. S. Shen Apr. 1982 22 p refs
(Contract USDA/FS-53-3187-1-42)
(PB82-250531; LEMSCO-17270; NFAP-269) Avail: NTIS HC A02/MF A01 CSCL 02F

The procedures used in a large-area survey of ponderosa pine mortality caused by the mountain pine beetle are described. These procedures are based on the use of high-altitude panoramic photography as a means of sampling the study area. They can be modified, based on local conditions, for other types of natural resource surveys. Author (GRA)

N83-16854# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
PHOTOINTERPRETATION GUIDE FOR IDENTIFYING PINES KILLED BY THE MOUNTAIN PINE BEETLE
R. D. Dillman and W. B. White (Forest Service, Houston, Tex.) Washington Apr. 1982 54 p refs
(Contract USDA/FS-53-3187-0-29)
(PB82-251778; LEMSCO-16333; NFAP-267) Avail: NTIS HC A04/MF A01 CSCL 02F

The photographic characteristics of two major host trees killed by the mountain pine beetle are illustrated in this guide. The two hosts are ponderosa pine (Pinus ponderosa) and lodgepole pine (Pinus contorta). These photographic characteristics were developed from high-altitude panoramic aerial photography and are applicable throughout the insect's natural range in the Western United States. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N83-16855*# National Aeronautics and Space Administration, Washington, D. C.
CONSTRUCTION, TESTING AND DEVELOPMENT OF LARGE WIND ENERGY FACILITIES
R. Windheim, ed. and R. Cuntze, ed. Sep. 1982 412 p Transl. into ENGLISH of proceedings of a Seminar on Energy Res. (West Germany), rept. Juel-Spez-138, 1981 p 1-415 Seminar held in Juelich, West Germany, 23-24 Mar. 1981 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-76933; NAS 1.15:76933; Juel-Spez-138) Avail: NTIS HC A18/MF A01 CSCL 10A

Building large rotor blades and control of oscillations in large facilities are discussed. It is concluded that the technical problems in the design of large rotor blades and control of oscillations can be solved. Author

N83-16856*# National Aeronautics and Space Administration, Washington, D. C.
CONSTRUCTION OF THE 18-METER WOODEN BLADE AT NIBE-MOLLE B
Peter C. Nielsen Nov. 1982 90 p refs Transl. into ENGLISH from "Konstuktion af 18M Fritbaerende Traevinge til Moelle B i Nibe" Rept-8203 Inst. of Building Technology and Structural Engineering, Aalborg, Denmark, Mar. 1982 100 p Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76996; NAS 1.15:76996) Avail: NTIS HC A05/MF A01 CSCL 10A

The construction of an 18 m cantilevered wooden rotor blade for wind turbine-B at Nibe, Denmark is reported. The project is described and conclusions are made based on calculations and tests on the rotor blade. Details are given on choice of material, construction, attachments and fittings, stress problems and loads. E.A.K.

N83-16857*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CONSTRUCTION OF LOW-COST, MOD-OA WOOD COMPOSITE WIND TURBINE BLADES
R. F. Lark 1983 17 p refs Proposed for presentation at the 28th Natl. SAMPLE Symp. and Exposition, Anaheim, Calif., 12-14, 1983
(Contract DE-AI01-76ET-20320)
(NASA-TM-83046; E-1493; DOE/NASA/20320-42; NAS 1.15:83046) Avail: NTIS HC A02/MF A01 CSCL 10A

Two sixty-foot, low-cost, wood composite blades for service on 200 kW Mod-OA wind turbines were constructed. The blades were constructed of epoxy resin-bonded Douglas fir veneers for the leading edge sections, and paper honeycombcored, birch plywood faced panels for the afterbody sections. The blades were joined to the wind turbine hub by epoxy resin-bonded steel load take-off studs embedded into the root end of the blades. The blades were installed on the 200 kW Mod-OA wind turbine facility at Kahuku, Hawaii, The blades completed nearly 8,000 hours of operation over an 18 month period at an average power of 150 kW prior to replacement with another set of wood composite blades. The blades were replaced because of a corrosion failure of the steel shank on one stud. Inspections showed that the wood composite structure remained in excellent condition. Author

N83-16858*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TESTING OF THE EAGLE-PICHER NICKEL-IRON, THE GLOBE ISOA LEAD-ACID, AND THE WESTINGHOUSE NICKEL-IRON BATTERY SUBSYSTEMS IN AN ELECTRIC-VEHICLE ENVIRONMENT
Robin Hewitt and Jim Bryant 15 Jul. 1982 283 p refs
(Contract DE-AI01-78CS-54209)
(NASA-CR-169801; JPL-Pub-82-91; DOE/CS-54209/10; NAS 1.26:169801) Avail: NTIS HC A13/MF A01 CSCL 10C

Three full size developmental batteries were tested with electric vehicles; two nickel-iron batteries and a lead-acid battery. Constant speed and driving schedule tests were done on a chassis dynamometer. Several aspects of battery performance were evaluated for capacity, recharge efficiency, voltage response, and self discharge. Each of these three batteries exhibited some strengths and some weaknesses. E.A.K.

N83-16859*# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Systems Div.
THE MOD-OA 200 KILOWATT WIND TURBINE GENERATOR DESIGN AND ANALYSIS REPORT Final Report
T. S. Andersen, C. A. Bodenschatz, A. G. Eggers, P. S. Hughes, R. F. Lampe, M. H. Lipner, and J. R. Schornhorst Aug. 1980 68 p refs
(Contracts DEN3-163; DE-AI01-76ET-20370)
(NASA-CR-165127; DOE/NASA/0163-1; NAS 1.26:165127; AESD-TME-3051) Avail: NTIS HC A04/MF A01 CSCL 10A

The project requirements, approach, system description, design requirements, design, analysis, system tests, installation safety considerations, failure modes and effects analysis, data acquisition, and initial performance for the MOD-OA 200 kw wind turbine generator are discussed. The components, the rotor, driven train, nacelle equipment, yaw drive mechanism and brake, tower, foundation, electrical system, and control systems are presented.

The rotor includes the blades, hub and pitch change mechanism. The drive train includes the low speed shaft, speed increaser, high speed shaft, and rotor brake. The electrical system includes the generator, switchgear, transformer, and utility connection. The control systems are the blade pitch, yaw, and generator control, and the safety system. Manual, automatic, and remote control and Dynamic loads and fatigue are analyzed. E.A.K.

N83-16860# Frezzolini Electronics, Inc., Hawthorne, N.J. General Research Labs. Div.
SEALED MINI-NICKEL CADMIUM BATTERY CHARGING TECHNIQUES, TECHNICAL INVESTIGATION REPORT Final Report, Dec. 1980 - Dec. 1981
James Crawford and Roger S. Pinkham Lakehurst, N.J. Naval Air Engineering Center 20 Sep. 1982 104 p refs
(Contract N68355-81-C-0502; WF41461400)
(AD-A119826; NAEC-92-161) Avail: NTIS HC A06/MF A01 CSCL 10/3

The results of this effort indicate that no correlation could be established between any particular charging mode and any resulting enhanced cell capacity, all tested cells being considered. A further result was that the cells exhibited high variability of performance when compared to one which had outstanding stability under all test conditions. Further study is recommended to investigate the actual performance of batteries, using mini-nickel cadmium cells produced for field use. As a result, new standards for sealed mini-nickel cadmium cell performance should be evolved for future rechargeable battery systems. Author (GRA)

N83-16861# R and D Associates, Arlington, Va.
RESEARCH NEEDS: PRIME-POWER FOR HIGH ENERGY SPACE SYSTEMS Final Report, 26 Oct. 1981 - 31 Jul. 1982
Peter J. Turchi Jul. 1982 100 p refs
(Contract F49620-82-C-0008; AF Proj. 2301)
(AD-A120209; RDA-TR-120900-001; AFOSR-82-0875TR) Avail: NTIS HC A05/MF A01 CSCL 22/2

By the year 2000, an increasingly large portion of our national defense will depend on space-based systems. As part of a broader set of new research initiatives in support of space systems, the Air Force Office of Scientific Research is sponsoring basic research that may be applicable to the development of megawatt-level space prime-power systems. The emphasis of this particular new initiative is prime-power versus pulsed power including power conditioning, such as flywheel or inductive storage, for which there are existing programs. GRA

N83-16862# Trans Energy Systems, Inc., Bellevue, Wash.
BELLINGHAM PHASE 3, ENGINEERING AND TECHNOLOGY DEVELOPMENT FOR A HOT-WATER DISTRICT-HEATING SYSTEM EMPLOYING THERMAL-ENERGY STORAGE
G. L. Vanroyen 1981 9 p Presented at the Ann. Contractor's Rev. Meeting on Thermal and Chem. Storage, Tysons Corner, Va., 19 Sep. 1981
(Contract W-7405-eng-26)
(DE82-000106; CONF-810940) Avail: NTIS HC A02/MF A01

Thermal energy storage in a district heating system which requires the integration of customer consumption rates, weather and other system operating conditions, as well as economic payback is evaluated. Generic methods of approaching and evaluating these factors are essential to insure that the most economical district heating projects are selected for development and that those systems are designed and operated in the most cost effective manner. Also, governmental and legal guidelines for interfacing with users, financing, and municipal utility regulations are examined DOE

N83-16863# Oak Ridge National Lab., Tenn. Energy Div.
ELECTRIC SYSTEM IMPACTS OF STORAGE HEATING AND STORAGE WATER HEATING, PART 2
C. W. Gellings, J. R. Redmon, J. P. Stovall, and T. W. Reddoch 1981 11 p refs Presented at the IEEE/PES Conf., Minneapolis, 20 Sep. 1981 Prepared in cooperation with Public Service Electric and Gas Co.
(Contract W-7405-eng-26)
(DE81-032010; CONF-810903-2) Avail: NTIS HC A02/MF A01

Primary and secondary electric distribution impacts of thermal storage heating and water heating systems are evaluated. The distribution the impacts based on the observed load characteristics are examined. DOE

N83-16864# Physical Sciences, Inc., Woburn, Mass.
HOT-GAS CLEANUP FOR MOLTEN-CARBONATE FUEL CELLS Quarterly Report, 19 May - 31 Jul. 1981
A. Gelb, D. Ham, P. Lewis, G. Lord, and G. Simons Nov. 1981 30 p refs
(Contract DE-AC21-81MC-16242)
(DE82-002500; DOE/MC-16242-1; PSI-TR-289; QR-1) Avail: NTIS HC A03/MF A01

Progress on task 1 (high temperature chlorine cleanup) is reported. Findings include: (1) the primary candidates for chloride cleanup are the alkali and alkaline earth carbonates or oxides; (2) ZnCl2 and FeCl3 are gaseous above 800 K and melt below 600 K, which could have severe implications for cleanup of sulfur with Zn/Fe oxides from streams where chloride is present; (3) very little information is available on kinetics and pore plugging of sorbents during chloride cleanup; and (4) the alkali carbonates appear to be by far the best sorbents for combined sulfur/chloride cleanup. Progress is also reported on task 2, soot control for molten carbonate fuel cell anode. Experiments run with various gas mixtures on smooth Ni surfaces, supported Ni catalyst and anode material have led to the conclusion that the Boudouard reaction for carbon deposition is much faster at fuel cell conditions than either the water shift reaction or the methanation reaction. DOE

N83-16865# Pacific Northwest Lab., Richland, Wash.
USER MANUAL FOR GEOCITY: A COMPUTER MODEL FOR COST ANALYSIS OF GEOTHERMAL DISTRICT-HEATING-AND-COOLING SYSTEMS. VOLUME 1: MAIN TEXT
H. D. Huber, L. L. Fassbender, and C. H. Bloomster Sep. 1982 223 p refs 2 Vol.
(DE82-022512; PNL-4422-Vol-1) Avail: NTIS HC A10/MF A01

The cost of residential space heating, space cooling, and sanitary water heating or process heating (cooling) using geothermal energy from a hydrothermal reservoir was calculated. The GEOCITY simulates the complete geothermal heating and cooling system, which consists of two principal parts: the reservoir and fluid transmission system and the distribution system. Geothermal space heating is provided by circulating hot water through radiators, convectors, and fan-coil units. Geothermal process heating is provided by directly using the hot water or by circulating it through a process heat exchanger. The life cycle cost of thermal energy from the reservoir and fluid transmission system to the distribution system and the life cycle cost of heat (chill) to the end users are calculated by discounted cash flow analysis. DOE

N83-16866# Pacific Northwest Lab., Richland, Wash.
USER MANUAL FOR GEOCITY: A COMPUTER MODEL FOR COST ANALYSIS OF GEOTHERMAL DISTRICT-HEATING-AND-COOLING SYSTEMS. VOLUME 2: APPENDICES
H. D. Huber, L. L. Fassbender, and C. H. Bloomster Sep. 1982 186 p refs 2 Vol.
(Contract DE-AC06-76RL-01830)
(DE82-022511; PNL-4422-Vol-2) Avail: NTIS HC A09/MF A01

A model to calculate the costs of residential space heating, space cooling, and sanitary water heating or process heating (cooling) using geothermal energy from a hydrothermal reservoir is discussed. The model can calculate geothermal heating and cooling costs for residential developments, a multi-district city, or a point demand such as an industrial factor or commercial building. All the appendices, including cost equations and models for the reservoir and fluid transmission system and the distribution system, descriptions of predefined residential district types for the distribution system, key equuations for the cooling degree hour methodology, and a listing of the sample case output are included.

The indices for the input parameters and subroutines defined in the user manual are given. DOE

N83-16867# Sperry Research Center, Sudbury, Mass.
SPERRY LOW-TEMPERATURE GEOTHERMAL CONVERSION SYSTEM. VOLUME 1: ORGANIC-WORKING-FLUID PROPERTIES Final Report
C. Carroll, K. R. Hules, R. Langley, B. Toekes, and D. P. Wilson 1981 135 p refs
(Contract DE-AC03-78ET-27125)
(DE82-018529; DOE/ET/27125-T1-Vol-1; SRC-CR-81-74-Vol-1) Avail: NTIS HC A07/MF A01

Measurements of the physical properties of R-114 refrigerant in the compressed liquid and dense gas regions are reported. Included are: experimental studies of the thermodynamic properties of R-114, enthalpy measurement by throttling experiment, engineering model of the thermodynamic properties of R-114, feasibility study to dissociate R-114 with a four cycle gasoline engine, transport properties of R-114, analytical procedure to determine impurities in R-114, toxicological information on Freons, and a literature search of published properties of R-114, other refrigerants, and other potential working fluids. DOE

N83-16868# Utah State Univ., Logan. Water Research Lab.
DESIGN CONSIDERATIONS IN THE USE OF GLAUBER SALT FOR ENERGY STORAGE
D. G. Chadwick and K. H. Sherwood Nov. 1981 51 p refs Sponsored by DOE
(DE82-019289; UWRL/P-81/05) Avail: NTIS HC A04/MF A01

Various design concepts for the utilization of the latent heat of Glauber salt at temperatures between 250 C and 500 C were studied. Consideration was given to system economics and what particular heat storage system if perfected would be most cost effective. The problems of limiting crystal size and heat transfer into and out of salt crystals is discussed. Crystal size is affected by the degree of agitation the salt solution experiences during the salt cooling process. Consequently, crystal size was moderated in a favorable way by introducing air bubbles at the bottom of the salt container. As the bubbles rise a mixing action occurs which limits crystal size and helps prohibit the accumulation of an anhydrons sludge that settles out of solution in the freezing thawing process. DOE

N83-16869# Sargent and Lundy, Engineers, Chicago, Ill.
COMPRESSED-AIR ENERGY STORAGE PRELIMINARY DESIGN AND SITE DEVELOPMENT PROGRAM IN AN AQUIFER. VOLUME 3, PART 1: SITE SELECTION STUDY Final Report
Sep. 1982 124 p refs Sponsored by Electric Power Research Inst. Prepared in cooperation with Public Service Co. of Indiana, Inc., Plainfield
(Contracts DE-AC02-78ET-29232; ET-78-C-01-2159; EPRI Proj. 1081-3)
(DE82-001251; EPRI-EM-2351-Vol-3-Pt-1) Avail: NTIS HC A06/MF A01

The site selection study aspects of an aquifer based compressed air energy storage facility. Aquifer sites in the Illinois and Indiana portions of the Illinois Basin were identified and ranked. A site was selected from the four top ranked sites and was then utilized in other project work as the host site for the preliminary design of a compressed air energy storage facility. DOE

N83-16870# Department of Energy, Washington, D. C. Office of Policy, Planning and Analysis.
ENERGY PROJECTIONS TO THE YEAR 2000, JULY 1982 UPDATE
Aug. 1982 134 p refs
(DE82-022523; DOE/PE-0029/1) Avail: NTIS HC A07/MF A01

This report is an update of the energy projections and analysis presented in a document entitled Energy Projections to the Year 2000, a technical supplement to the National Energy Policy Plan (NEPP) submitted to Congress in July 1981. The format focuses on self-explanatory tables and figures with a minimum of accompanying text. DOE

N83-16871# Solarex Corp., Rockville, Md.
DESIGN AND FABRICATION OF A PROTOTYPE SYSTEM FOR A PHOTOVOLTAIC RESIDENCE IN THE NORTHEAST
Aug. 1982 87 p refs Prepared in cooperation with Mueller Associates, Inc., Baltimore and Price and Partners, Takoma Park, Md. Prepared for Lincoln Lab., MIT, Lexingington, Mass.
(Contract DE-AC02-76ET-20279)
(DE82-022497; DOE/ET-20279-224) Avail: NTIS HC A05/MF A01

This project consisted of the design, fabrication, and testing of a photovoltaic residence which is suitable for construction in the Northeast. A full size residence was designed which included energy conserving and passive features, and the energy performance of the residence was completed for a 5 kW PV array in a standoff configuration. Actual construction consisted of the roof structure and a building enclosure large enough to contain the PCU, test equipment, and load simulation equipment. The PV array consists of 78 modules along with a line tie inverter. DOE

N83-16872# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Energy Systems Div.
DESIGN AND FABRICATION OF A PROTOTYPE SYSTEM FOR PHOTOVOLTAIC RESIDENCES IN THE NORTHEAST Final Report
P. F. Pittman and R. T. Dressler Jun. 1982 115 p
(Contract DE-AC02-76ET-20279)
(DE82-022210; DOE/ET-20279/199) Avail: NTIS HC A06/MF A01

A single family residence including a solar photovoltaic power system was designed for the Northeast. The residence utilizes passive solar and energy conservation techniques to minimize the annual electrical load. A prototype of the electrical system was constructed and maintained for one year. The array is integrally mounted using a new panel installation concept, and produces 5.7-kW peak at standard test conditions (100 mW/cm(2), 280C, Am 1.5). The system is interactive with the utility and uses a voltage fed, self commutated power conditioner. The system operates automatically training on and off as the sun rises and sets. DOE

N83-16873# Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLAR-PHOTOVOLTAIC POWER FOR BROADCASTING STATIONS: AN ECONOMIC ANALYSIS
B. E. Nichols and M. T. Katzman Aug. 1982 51 p refs
(Contract DE-AC02-76ET-20279)
(DE82-022498; DOE/ET-20279/223) Avail: NTIS HC A04/MF A01

An economic analysis of the profitability for broadcasting stations of replacing conventional electricity with on-site solar photovoltaic power systems was undertaken. Technological characteristics of these power systems are presented along with the economic assumptions necessary for their evaluation. Time of initial profitability, time of optimal investment, optimum system capacity, and impact of tax incentives on profitability are analyzed for several locations in the country representative of the range of insolation conditions. The analyses indicate that photovoltaic power systems are expected, if cost predictions are met, to prove profitable for the broadcasting market in the Southwest by the early 1980s, in the South by the mid-1980s and in the Northeast by the late 1980s. The study was performed in 1979 and was used to help design an experimental PV power system for a radio station in Ohio, which was installed in that year and is operating successfully. DOE

N83-16874# Geological Survey, Norman, Okla.
GEOTHERMAL RESOURCE ASSESSMENT IN OKLAHOMA
M. Lynn Prater, Paul K. Cheung, Kenneth V. Luza, and William E. Harrison Oct. 1981 45 p refs
(Contract DE-AS07-80ID-12172)
(DE82-021288; DOE/ID-12172/T1) Avail: NTIS HC A03/MF A01

In September 1980, the Oklahoma Geological Survey began a program to assess the geothermal potential of the state. The

program, thus far, consists of: the preparation of a detailed geothermal-gradient map of Oklahoma at a scale of 1:500,000; and site-specific investigations of gradient and subsurface conditions in areas that appear to have geothermal potential. Two areas where recent mapping showed the high gradients (2.10F/100 feet) were selected for detailed study. These areas are in Haskell and Pittsburgh Counties. Volume was estimated as was deliverability of formation water potentially available from several sandstone units for geothermal applications. The Spiro and Cromwell sands were chosen for the Pittsburgh anomaly. DOE

N83-16875# Oak Ridge National Lab., Tenn. Chemistry Div.
PHYSICAL CHEMISTRY OF MOLTEN-SALT BATTERIES. CURRENT-INDUCED COMPOSITION GRADIENTS IN MOLTEN LiCl-KCl Final Report, 1 Oct. 1980 - Sep. 1981
C. E. Vallet, D. E. Heatherly, and J. Braunstein Oct. 1982 20 p refs
(Contract W-7405-eng-26)
(DE83-001684; ORNL/TM-8489) Avail: NTIS HC A02/MF A01

Current induced composition gradients were predicted in mixed molten salt battery electrolytes. Composition shifts, if large enough, can produce significant deleterious effects, such as solid phase precipitation in or near the electrodes of molten salt batteries, including the LiAl/LiCl-KCl/Fe-S sub x battery. Quantitative measurements are needed to determine the extent of the gradients and to find means to reduce them. The first quantitative scanning electron microscopy/X ray fluorescence (SEM/EDX) measurements with high distance resolution (< 50 (SIGMA) m) of the shape of the composition profile in LiCl-KCl electrolyzed between LiAl electrodes is given. Also, current induced pecipitation of LiCl in a porous LiAl anode is indicated by SEM/EDX examination. The measured compositions are consistent with predictions from mass transport models based on the electrode reactions, migrational and diffusional mobilities. DOE

N83-16876# Oak Ridge National Lab., Tenn. Environmental Sciences Div.
USING PEAT FOR ENERGY: POTENTIAL ENVIRONMENTAL RESTRAINTS. OVERVIEW
R. M. Reed, L. D. Voorhees, and P. J. Mulholland 1981 37 p refs Presented at the 2nd Conf. on Peat as an Alternative, Arlington, Va., 1 Dec. 1981
(Contract W-7405-eng-26)
(DE82-005201; CONF-811217-1) Avail: NTIS HC A03/MF A01

Serious consideration is being given to using peat as an energy resource in Minnesota, North Carolina, Florida, and some New England States. Potential environmental constraints for using peat as an energy resource are associated with disruption of important regional wetland ecosystems. Mining peatlands may significantly modify ground and surface water hydrology, degrade water quality in downstream receiving systems, contribute to the deterioration of local air quality, disrupt or eliminate plant and animal populations having specialized requirements and limited distributions, and destroy unique wetland ecosystems representing important scientific and educational resources. Careful selection of peatlands to be developed and application of appropriate mitigation and monitoring programs will be necessary to offset these impacts. DOE

N83-16877# Brookhaven National Lab., Upton, N. Y. Solar Technology Group.
FLAT-PLATE SOLAR COLLECTORS UTILIZING POLYMERIC FILM FOR HIGH PERFORMANCE AND VERY LOW COST
William G. Wilhelm 1981 8 p ref Presented at the Intern. Solar Energy Soc. Solar World Forum, Brighton, England, 23-28 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE82-004797; BNL-30148; CONF-810865-6) Avail: NTIS HC A02/MF A01

Polymeric films are used in the construction of the absorber and window portions of a flat plate solar collector. The absorber heat exchanger consists of a channeled liquid envelope constructed using a polymeric film and metal foil laminate. In addition, the composite films and light frame monocoque construction contribute to very light weight and low cost. The use of high-performance polymers permits low-loss designs with high thermal performance. The construction concepts are consistent with high speed mass production and installation with manufacturing cost projections of $15 or 2 square meters. Tests indicate performance potential consistent with applications incorporating solar absorption air conditioning. DOE

N83-16878# Sandia Labs., Albuquerque, N. Mex.
VARIATION IN THE MICROSTRUCTURE OF ELECTRODEPOSITED BLACK CHROME SOLAR COATINGS
Richard B. Pettit, James N. Sweet, and Robert Sowell 1982 36 p refs Presented at the MiCon Symp., Houston, Tex., 18 Jan. 1982
(Contract DE-AC04-76D-00789)
(DE81-030842; SAND-81-0293C; CONF-820102-1) Avail: NTIS HC A03/MF A01

Electrodeposited black chrome solar coatings were found to thermally degrade when used at temperatures near 300 C. This degradation is evidenced by a large decrease in the solar absorptance for these coatings. A detailed study is done of the dependence of the coating microstructure and composition on the plating process variables and how these film properties change after thermal aging. A model was developed of the black chrome coating. This model is used to calculate the reflectance properties as a function of the average Ci2O3 vol % within the film. The calculated reflectance curves are compared to experimental data for coatings aged for various times at 450 C in air. Both model and experiment show that the solar absorptance initially decreases only slowly as the amount of Ci2O3 increases; however, a rapid decrease occurs when the Ci2O3 content passes 70 vol %. DOE

N83-16879# Brookhaven National Lab., Upton, N. Y.
THERMAL PERFORMANCE OF THE BROOKHAVEN NATURAL THERMAL STORAGE HOUSE
H. T. Ghaffari and R. F. Jones 1981 12 p refs Presented at the Solar World Forum, Brighton, England, 23-28 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE82-005507; BNL-30268; CONF-810865-8) Avail: NTIS HC A02/MF A01

In the Brookhaven natural thermal storage house, an energy-efficient envelope, passive solar collectors, and a variety of energy conservation methods are incorporated. The thermal characteristics of the house during the tested heating season are evaluated. Temperature distributions at different zones are displayed, and the effects of extending heating supply ducts only to the main floor and heating return ducts only from the second floor are discussed. The thermal retrievals from the structure and the passive collectors are assessed, and the total conservation and passive solar contributions are outlined. Several correlation factors relating these thermal behaviors are introduced, and their diurnal variations are displayed. Finally, the annual energy requirements, and the average load factors are analyzed and discussed. DOE

N83-16880# Oak Ridge National Lab., Tenn. Energy Div.
HYDRAULIC AIR COMPRESSOR FOR OCEAN THERMAL ENERGY CONVERSION APPLICATIONS
F. C. Chen and A. Golshani 1981 12 p refs Presented at the 4th Intern. Conf. on Alternative Energy Sources, Miami Beach, Fla., 14-16 Dec. 1981
(Contract W-7405-eng-26)
(DE82-005198; CONF-811212-5) Avail: NTIS HC A02/MF A01

A hydraulic air compressor, which requires no mechanical moving parts, but only a downward flow of water to accomplish air compression and which operates at a nearly isothermal mode, can be an alternative for the noncondensible gas disposal of an Ocean Thermal Energy Conversion (OTEC) open-cycle power system. An air compressor test loop was assembled and operated to obtain test data that would lead to the design of an OTEC hydraulic air compressor. A one-dimensional, hydraulic gas compressor computer model was employed to simulate the laboratory experiments. Based on the computer model and the preliminary test results the feasibility of optimizing the performance

of an OTEC noncondensible gas disposal system using a hydraulic air compressor was assessed. DOE

N83-16881# Midwest Research Inst., Golden, Colo. Photovoltaics Div.
INFLUENCE OF GRAIN BOUNDARIES ON SOLAR CELL PERFORMANCE
J. B. Milstein, Y. S. Tsuo, R. W. Hardy, and T. Surek May 1981 7 p refs Presented at the 15th IEEE Photovoltaic Spec. Conf., Orlando, Fla., 12-15 May 1981
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE82-004662; SERI/TP-614-1219; CONF-810526-40) Avail: NTIS HC A02/MF A01
For abstract see A82-45133.

N83-16882# Sandia Labs., Albuquerque, N. Mex. Photovoltaic Systems Development Div.
GAME-THEORY APPROACH TO CONSUMER INCENTIVES FOR SOLAR ENERGY
John K. Sharp Nov. 1981 12 p refs
(Contract DE-AC04-76DP-00789)
(DE82-004501; SAND-81-1618) Avail: NTIS HC A02/MF A01
Solar energy is currently not competitive with fossil fuels. Fossil fuel price increases may eventually allow solar to compete, but incentives can change the relative price between fossil fuel and solar energy, and make solar compete sooner. Examples are developed of a new type of competitive game using solar energy incentives. Competitive games must have players with individual controls and conflicting objectives, but recent work also includes incentives offered by one of the players to the others. In the incentive game presented here, the Government acts as the leader and offers incentives to consumers, who act as followers. The Government incentives offered in this leader-follower (Stackelberg) game reduce the cost of solar energy to the consumer. Both the Government and consumers define their own objectives with the Government determining an incentive (either in the form of a subsidy or tax) that satisfies its objective. The two hypothetical examples developed show how the Government can achieve a stated utilization rate with the proper incentives. DOE

N83-16883# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
WIND SYSTEM VALUE ANALYSIS FOR ELECTRIC UTILITIES: A COMPARISON OF FOUR METHODS
Jim Harper, David Percival, Theresa Flaim, and R. L. Sullivan (Florida Univ.) Nov. 1981 14 p refs Presented at the 5th Biann. Wind Workshop and Conf., Washington, D.C., 5-7 Oct. 1981
(Contract DE-AC02-77CH-00178)
(DE82-006963; SERI/TP-214-1464; CONF-811043) Avail: NTIS HC A02/MF A01
The only known effort that used more than a single methodology for the value analysis of wind energy conversion systems (WECS) to a specific utility is discussed. The WECS utility value analysis methodologies of Aerospace Corp., JBF Scientific Corp., and the Solar Energy Research Institute (SERI) are discussed. Results of the application of these three methodologies were found for two large utilities. Break-even values (the amount a utility can pay for a wind turbine over its lifetime and still breakeven economically) were found to be from $1600 to $2400 per kW of wind capacity in 1980 dollars. The reasons for variation in the results are discussed. DOE

N83-16884# Oak Ridge National Lab., Tenn. Energy Div.
ENERGY AUDITS AT 48 HOSPITALS
Eric Hirst 1981 6 p refs Presented at the 4th World Eng. Congr., Atlanta, Ga., 12 Oct. 1981
(Contract W-7405-eng-26)
(DE82-002814; CONF-811030-3) Avail: NTIS HC A02/MF A01
Staff at the Oak Ridge Associated Universities (ORAU) conducted energy audits at 48 hospitals in four states (New York, Pennsylvania, Virginia, Tennessee) between 1978 and 1980. Staff at the Oak Ridge National Laboratory (ORNL) and ORAU developed and organized a computerized data base containing information from these audits. This paper describes the ORAU audit process; summarizes the data collected from these audits on hospital characteristics annual energy use, and the audit recommendations; and analyzes the audit data in terms of cost effectiveness, type of recommendations, and the relationship between potential energy saving and characteristics of the individual hospital. DOE

N83-16885# California Univ., Berkeley. Lawrence Berkeley Lab. Energy Efficient Buildings Program.
EFFICIENT DAYLIGHTING IN THERMALLY CONTROLLED ENVIRONMENTS
Eliyahu Neeman (Israel Inst. of Technology, Haifa) and Stephen Selkowitz Oct. 1981 14 p refs Presented at the Intern. Passive and Hybrid Cooling Conf., Miami Beach, Fla., 11-13 Nov. 1981
(Contract W-7405-eng-48)
(DE82-003045; LBL-13399; CONF-811109-4) Avail: NTIS HC A02/MF A01
Many of the design considerations required to enable a design team to utilize daylight to the maximum possible extent are reviewed in order to reduce electric lighting loads and associated building energy consumption. Among steps that must be taken is a thorough analysis of all heating and cooling loads inside the building and the heat exchange through the building envelope. Data on local climate and sunshine availability must also be considered. Although the energy aspects have recently dominated design considerations, daylight's influence on human well being is gaining importance. In this respect, the variability of daylight, the quality of its spectral composition, the view out, and health effects are along the aspects that should be considered when determining an appropriate role for daylighting in energy efficient buildings. DOE

N83-16886# Oak Ridge National Lab., Tenn. Energy Div.
ANALYSIS OF ENERGY USE AT US INSTITUTIONAL BUILDINGS
Eric Hirst, John Trimble, and Richard Goelitz Nov. 1981 41 p refs
(Contract W-7405-eng-26)
(DE82-004670; ORNL/CON-78) Avail: NTIS HC A03/MF A01
The Federal Institutional Conservation Program includes collection of energy use and energy related data from individual institutional buildings. Data were obtained from ten states (Massachusetts, New Hampshire, Vermont, New Jersey, Florida, Minnesota, Wisconsin, Texas, Kansas, and Oregon) on almost fifteen thousand schools, hospitals, local government buildings, and public care institutions. After the data were carefully examined, organized, and validated (i.e., outliers that might be errors were deleted), regression equations were developed for each of the four institutional building types. Because so many of the data elements were either missing or outliers, techniques were applied that allow incorporation of observations with missing data in the regression analysis. These equations explain annual energy use as functions of average energy price, floor area, year of construction, occupancy, air conditioning, primary heating fuel, owner, location, and building function. DOE

N83-16887# Pacific Northwest Lab., Richland, Wash.
COLLECTION, TRANSPORTATION, AND STORAGE OF BIOMASS RESIDUES IN THE PACIFIC NORTHWEST
L. K. Inaba and D. E. Eakin Nov. 1981 56 p refs
(Contract DE-AC06-76RL-01830)
(DE82-004737; PNL-4114) Avail: NTIS HC A04/MF A01
Potential methods for the collection, transportation and storage of agricultural and forest residues in the Pacific Northwest are discussed. Information was gathered from available literature and through contacts with researchers, equipment manufacturers, and other individuals involved in forest and agricultural activities. This information was evaluated, combined, and adapted for situations existing in the Pacific Northwest. A number of methods for collection, transportation, and storage of biomass residues using currently available technology are described. Many of these

methods can be applied to residue fuel materials along with their current uses in the forest and agricultural industries. DOE

N83-16888# Los Alamos Scientific Lab., N. Mex.
ANNUAL THERMAL PERFORMANCE OF SUNSPACE-TYPE PASSIVE-SOLAR COLLECTORS FOR RESIDENCE HEATING: ATTACHED AND SEMI-ENCLOSED GEOMETRIES
R. D. McFarland, R. W. Jones, and G. S. Lazarus Sep. 1982 79 p refs
(Contract W-7405-eng-36)
(DE83-002310; LA-9424-MS) Avail: NTIS HC A05/MF A01

The sunspace which is an important category of passive solar system for heating small and moderate sized building was analyzed. There is a wide variety of possible geometries of sunspaces, and a few of these were analyzed to obtain simplified annual performance estimation equations in the form of solar load ratio correlations. The details and correlations of all of the configurations analyzed are summarized. Author

N83-16889# Vitro Labs., Silver Spring, Md. Solar System Analysis Group.
COMPARATIVE REPORT: PERFORMANCE OF SOLAR HOT-WATER SYSTEMS, 1980 - 1981
M. A. Cramer, J. W. Spears, and E. O. Pollock 1982 202 p refs
(Contract DE-AC01-79CS-30027)
(DE83-000069; SOLAR/0024-82/41) Avail: NTIS HC A10/MF A01

Data are provided on 42 solar water heater sites in the National Solar Data Network. Individual site parameters are tabulated such as collector areas, storage tank sizes, manufacturers, collector fluids, etc. Hot water heating data for 1980 to 1981 are tabulated and summarized, and analysis results are graphed to highlight key summary information. Observations on the performance of the systems are summarized with discussions of specific cases and conclusions which may be drawn. Specific detailed data and information necessary to support the development of results presented are appended. DOE

N83-16890# Vitro Labs., Silver Spring, Md.
RYMARK 1, RYMARK 2, AND RYMARK 3, FREDERICK, MARYLAND: SOLAR-ENERGY-SYSTEM PERFORMANCE EVALUATION, MAY 1981 THROUGH MARCH 1982
J. W. Spears 1982 125 p refs
(Contract DE-AC01-79CS-30027)
(DE83-000067; SOLAR/1106-82/14; SOLAR/1110-82/14; SOLAR/1107-82/14) Avail: NTIS HC A06/MF A01

Sites of single family Maryland residences whose respective passive solar energy systems are designed to supply 16%, 28%, and 42% of their heating loads were examined. Each is equipped with a 24,000-Btu heat pump for auxiliary heating. Rymark 1 is equipped with 92 square feet of south facing double glazed windows. Rymark 2 is equipped with 150 square feet of south facing triple panel windows. Rymark 3 is equipped with 227 square feet of south facing triple pane windows with blinds and 560 square feet of phase change ceiling tile system. Monthly performance data are tabulated and compared for the overall system of each house, and for the collector, space heating, and storage subsystem. For each house and for each month, the insolation, ambient air and building temperature, and auxiliary energy used are graphed vs. day of the month. These data are also graphed vs. hour of the day for a typical day. Monthly data are also tabulated for the environment in the passive systems, energy savings, and weather conditions. DOE

N83-16891# Department of Energy, Oak Ridge, Tenn. Technical Information Center.
ENERGYGRAMS: BRIEF DESCRIPTIONS OF ENERGY TECHNOLOGY
William F. Simpson, Jr., ed. 1982 91 p
(DE82-003278; DOE/TIC/EGC-82/1; PB82-903601; ISSN-0731-6291) Avail: NTIS HC A05/MF A01

The Energygram program transfers information and technology generated from research to identifiable audiences in industry, education, and federal, state, and local government. Research and development projects for the transfer program are identified and the technical content of Energygrams before publication are reviewed. Energygrams are usually one page illustrated bulletins describing DOE technology or data and telling how to obtain the technical reports or other material on which they are based. The compilation is organized by subject categories, and, within each category, Energygrams are presented alphabetically by Energygram title. DOE

N83-16892# Department of Energy, Oak Ridge, Tenn. Technical Information Center.
ENERGYGRAMS: BRIEF DESCRIPTIONS OF ENERGY TECHNOLOGY
William F. Simpson, Jr., ed. Dec. 1981 87 p
(DE82-003277; DOE/TIC/EGC-81) Avail: NTIS HC A05/MF A01

Energygrams are a compilation of technical notes for the purpose of transferring information and technology generated from research to identifiable audiences in industry, education, and federal, state, and local government. All DOE R and D reports are screened for identification of appropriate information. It coordinates laboratory and contractor program managers by identifying research and development projects for the transfer program and in reviewing the technical content of Energygrams before publication. Energygrams are usually one page illustrated bulletins describing DOE technology or data and telling how to obtain the technical reports or other material on which they are based. The compilation is organized by subject categories, and, within each category, Energygrams are presented alphabetically by Energygram title. DOE

N83-16893# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
MINICIPAL-SOLID-WASTE BICONVERSION TECHNOLOGIES
Stephen A. Leeper, James H. Wolfram, Mudan L. Chow, and Larry J. Dawley Oct. 1982 74 p refs
(Contract DE-AC07-76ID-01570)
(DE83-000263; EGG-2193) Avail: NTIS HC A04/MF A01

The bioconversion approach in which municipal solid waste (MSW) is a resource from which methane, ethanol, and chemicals can be produced by anaerobic digestion and fermentation is discussed. The quantity and volume of MSW requiring disposal are reduced and stabilized. The relevant literature was surveyed and is reviewed. The availability, composition, and properties of MSW are reported. Pretreatment of lignocellulosic material, the predominant compound of MSW, is described and discussed, including mechanical chemical, and physical processes. DOE

N83-16894# Vitro Labs., Silver Spring, Md.
CONTEMPORARY SYSTEMS, INC., WALPOLE, NEW HAMPSHIRE SOLAR-ENERGY-SYSTEM PERFORMANCE EVALUATION Progress Report, Oct. 1981 - Apr. 1982
B. D. Howard 1982 97 p refs
(Contract DE-AC01-79CS-30027)
(DE83-000068; SOLAR-2116-82/14) Avail: NTIS HC A05/MF A01

A hybrid solar building in New Hampshire designed to obtain 71% of its space heating and 75% of its water heating from solar energy was evaluated. The active solar system is equipped with 800 square feet of flat plate air collectors and two site built rock bins. There is also a window wall and sunspace. Auxiliary water heating is electric. Monthly performance data are tabulated for the solar system overall, for the active and passive collector systems, water and space heating subsystems, and the building. Monthly data for the solar coefficients of performance, building environment, solar operating energy, energy savings, and weather conditions are also tabulated. Typical system operation is illustrated by graphs for a typical day of the hourly temperatures at different parts of the system, active heating system fluid flow rate, and total insolation. Typical system operating sequences are also graphed, as well as the solar energy use. DOE

N83-16895# Vitro Labs., Silver Spring, Md.
GILL HARROP, BIG FLATS, NEW YORK SOLAR-ENERGY-SYSTEM PERFORMANCE EVALUATION Progress Report, Nov. 1980 - Apr. 1982
B. D. Howard 1982 97 p refs
(Contract DE-AC01-79CS-30027)
(DE83-000065; SOLAR-1096-82/14) Avail: NTIS HC A05/MF A01

The Gill Harrop site is a single family residence located in New York with a passive solar energy system designed to supply 75% of the heating load. The system is equipped with 403 square feet of windows, including 98 square feet of clerestory windows, an R-3.4 window quilt on all glazing, an 80,400 pound insulated concrete floor slab and two mass walls totalling 95,240 pounds, and electric baseboard auxiliary heaters of 9.5 kW total capacity. Monthly performance data are tabulated for the overall system and for the collector, storage, and space heating subsystems and for the environment in the passive system, energy savings, and weather conditions. Graphs for each month of the auxiliary energy used, ambient, storage, and building temperatures, and insolation vs. day of the month are presented. These data are also graphed for a typical day. DOE

N83-16896# Boeing Computer Services, Inc., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT FOR LOVINGTON SQUARE SHOPPING CENTER, LOVINGTON, NEW MEXICO
Sep. 1982 27 p Prepared for Sandia Labs
(Contract DE-AC04-76DP-00789)
(DE83-000391; SAND-81-7085/12) Avail: NTIS HC A03/MF A01

Data accumulated during May at the intermediate photovoltaic project at Lovington Square Shopping Center, Lovington, New Mexico are presented. Generated energy and environmental data are presented graphically. Explanations of irregularities not attributable to weather are provided. DOE

N83-16897# Boeing Computer Services, Inc., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT. VOLUME 1: G. N. WILCOX MEMORIAL HOSPITAL, KAUAI, HAWAII
Sep. 1982 70 p Prepared for Sandia Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE83-000393; SAND-81-7080/1-Vol-1) Avail: NTIS HC A04/MF A01

Presented are the data accumulated during January, February, and March 1982 at the intermediate photovoltaic project at G.N. Wilcox Memorial Hospital, Kauai, Hawaii. Generated energy and environmental (weather) data are presented graphically. Explanations of irregularities not attributable to weather are provided. DOE

N83-16898# Florida Solar Energy Center, Cape Canaveral.
INNOVATIVE PHOTOVOLTAIC APPLICATION FOR RESIDENCES EXPERIMENT Final Report
Gobind H. Atmaram and Arthur H. Litka Jun. 1982 108 p Prepared in cooperation with Lincoln Lab, MIT, Lexington
(Contract DE-AC02-76ET-20279)
(DE83-000399; DOE/ET-20279/210) Avail: NTIS HC A06/MF A01

Operational results on the performance of the 5 kilowatt peak photovoltaic residential system at the Florida Solar Energy Center (FSEC) described. Operational performance results of 1 year on the FSEC photovoltaic residential system are presented. The description of the residence, photovoltaic system, instrumentation and data collection procedure is included. The performance of the photovoltaic array, inverters and total photovoltaic system is detailed. The instrumentation upgrading, system diagnostics, and any failures or system downtime are described. DOE

N83-16899# EIC, Inc., Newton, Mass.
INVESTIGATION OF INTERCALATED COMPOUNDS FOR PHOTOELECTROCHEMICAL ENERGY STORAGE Final Report, 23 Feb. 1981 - 22 Feb. 1982
R. D. Rauh Jul. 1982 52 p refs Prepared in cooperation with California Univ., Lawrence Berkeley Lab.
(Contract DE-AC03-76SF-00098)
(DE83-000543; LBL-14794) Avail: NTIS HC A04/MF A01

Layered chalcogenides of general formula MX2 were investigated for the storage of electrical energy generated by photoelectrochemical solar cells. These storage materials are economical and have excellent volumetric energy densities which allows direct incorporation into flat plate photovoltaic modules. Two apporoches were evaluated: (1) intercalation electrodes such as Cu/sub x/TiS2 which can be charged by a separated regenerative photoelectrochemical cell; and (2) active photointercalation/photodeintercalation cells in which the storage step is effected directly by irradiating a layered semiconducting photoelectrode. DOE

N83-16900# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
ORGANIC RANKINE CYCLE COUPLED TO A SOLAR POND BY DIRECT-CONTACT HEAT EXCHANGE - SELECTION OF A WORKING FLUID
John D. Wright Jun. 1982 36 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE82-020998; SERI/TR-631-1122R) Avail: NTIS HC A03/MF A01

Heat from a solar pond may be used to drive an organic Rankine cycle and produce electricity. Due to the inherent low efficiency of low temperature cycles, large amounts of heat must be transferred, and heat exchangers may account for up to 50% of the plant cost. Use of a direct contact boiler, in which the organic fluid is bubbled through a stream of pond brine, may reduce the plant cost by about 25%. The choice of a working fluid affects plant efficiency, turbine cost, and the loss rate of the organic fluid. Low vapor pressure fluids maximize cycle efficiency by minimizing pumping requirements, but require a larger turbine. Efficiency affects the size and cost of the entire plant and low pressure fluids are preferred. The saturated and halogenated hydrocarbons were evaluated for use as working fluids. It is found that the working fluid is best suited to this application, because of high efficiency, low solubility in the pond, and a reasonable turbine cost. DOE

N83-16901# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
PERFORMANCE AND OPERATIONAL EXPERIENCE OF A PROTOTYPE BINARY GEOTHERMAL POWER PLANT
G. L. Mines 1981 20 p Presented at the IECEC Conf., Atlanta, 9 Aug. 1981
(Contract DE-AC07-76ID-01570)
(DE82-006289; EGG-M-01581; CONF-810812-41) Avail: NTIS HC A02/MF A01

The production of electric power from a moderate temperature geothermal resource was investigated. The initial production of electrical power was accomplished with the prototype power plant which was built to demonstrate the operation of binary power cycles where the energy in the geothermal fluid is transferred to a secondary working fluid. During the automatic run test the plant produced a maximum of 59kW(e). During the automatic run test, the plant operation was stable and the facility was operated for 1357 hours producing electrical power approximately 87% of the time geothermal fluid was available for operation. DOE

N83-16902# Ministry of Energy, Wellington (New Zealand).
ENERGY PLAN, 1981
1981 86 p
(DE82-902329; NP-2902329) Avail: NTIS (US Sales Only) HC A05/MF A01; DOE Depository Libraries

The planning procedures for the energy program and policy guidelines for energy planning are presented. Future changes in marginal costs and directions indicated for economically efficient pricing are assessed. The aim of the conservation program is to

close the gap between the amounts of conservation which is rationally cost effective and that projected to occur anyway through normal market forces. An overview of energy demand and proposed plans for energy supply are given. Liquid fuels have priority although work on coal receives new emphasis. A better program on energy demand and management is suggested. DOE

N83-16903# Purdue Univ., Lafayette, Ind.
ENERGY CONSERVATION IN HISTORIC STRUCTURES: AN INFORMATION/AWARENESS BULLETIN
Frederick T. Sparrow, ed. and Sue J. Kopka, ed. 1981 544 p refs
(Contract DE-AC02-80CS-30401)
(DE82-005212; DOE/CS-30401/1) Avail: NTIS HC A23/MF A01

Energy conserving features of selected historic structures are investigated. Site specific data, concerned with 18th to 20th century historic structures and their predominantly passive energy conservation features are emphasized. The US was divided into 4 climatic bioregions - hot-humid; temperate; hot-arid; and cool northern regions. Research information was compiled for each of the four climatic regions. The climatic region i.e., its inherent climatic/physiographic characters and the social/cultural history are discussed. The four emphasis areas (ventilation, cooling, etc.) as they relate to the specific climatic region are also discussed. Features were considered according to their prevalence and specific reference is made to sites in which the features were displayed. Two in-depth case studies are presented in which the energy conserving features of a specific site are explored. DOE

N83-16904# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
ANALYSES OF MIXED HYDROCARBON BINARY THERMODYNAMIC CYCLES FOR MODERATE TEMPERATURE GEOTHERMAL RESOURCES
O. J. Demuth 1981 6 p refs Presented at the IECEC Conf., Atlanta, 9 Aug. 1981
(Contract DE-AC07-76ID-01570)
(DE82-006272; CONF-810812-42) Avail: NTIS HC A02/MF A01

A number of binary geothermal cycles utilizing mixed hydrocarbon working fluids were analyzed with the overall objective of finding a working fluid which can produce low-cost electrical energy using a moderately low temperature geothermal resource. Both boiling and supercritical shell-and-tube cycles were considered. The hydrocarbon working fluids analyzed included methane, ethane, propane, isobutane, isopentane, hexane, heptane, and mixtures of those pure hydrocarbons. For comparison, two fluorocarbon refrigerants were also analyzed. Preliminary estimates of relative heat exchanger size (product of overall heat transfer coefficient times heater surface area) were made for a number of the better performing cycles. For the 280 F resource, a mixture of 90% propane and 10% isopentane in a supercritical cycle showed the highest value of net geofluid effectiveness of the working fluids assessed. The more promising of the cycles employing mixed hydrocarbon working fluids require heaters which are estimated to range from seven to approximately 50% larger in total surface area than those for the reference cycles. DOE

N83-16905# Pacific Northwest Lab., Richland, Wash.
BENCH SCALE RESEARCH IN BIOMASS DIRECT LIQUEFACTION
Douglas C. Elliott 1981 23 p refs Presented at the 13th Biomass Thermochem. Conversion Contractors' Meeting, Washington, 27 Oct. 1981
(Contract DE-AC06-76RL-01830)
(DE82-005228; PNL-SA-9983; CONF-8110115-3) Avail: NTIS HC A02/MF A01

The progress of process research and product analysis effort on biomass direct liquefaction is analyzed. The results during the past six months are described, including analysis of the final product. Additional product analyses are vapor pressure and heat of vaporization data, product stability, pour point and gas chromatography - and liquid chromatography - mass spectrometry results. Additional studies were made on the utilization of phenolics through methylation, hydrotreating, and butylation as well as direct usage as gasoline extenders. Separation of phenolics from the product as well as the question of corrositivity are addressed. The impact of this study on the biomass direct liquefaction program is related and the implications for other liquefaction techniques are discussed. DOE

N83-16906# Sandia Labs., Albuquerque, N. Mex.
OPERATIONAL EXPERIENCES OF A DOWNHOLE STEAM GENERATOR
B. W. Marshall 1982 17 p refs Presented at the California Regional SPE Meeting, San Francisco, 24 Mar. 1982
(Contract DE-AC04-76DP-00789)
(DE82-010161; SAND-82-0394C; CONF-820316-1) Avail: NTIS HC A02/MF A01

The US Department of Energy supported the development of downhole steam generators for enhanced oil recovery as a part of Project DEEP STEAM. A final step in the development program was to deploy a downhole steam generator in the field to demonstrate its reliable operation and to evaluate the effect of the combined steam/exhaust products effluent on the reservoir. Sandia National Laboratories entered into an agreement with the City of Long Beach to place two direct contact, high pressure combustors in the Wilmington Field in Long Beach, California. These units one downhole and the other on the surface, have now been operated for a few months and gas communication with the production wells measured. The operational experience of this field experiment are discussed. DOE

N83-16907# California Univ., Riverside. Inst. of Geophysics and Planetary Physics.
OXYGEN ISOTOPE EXCHANGE IN ROCKS AND MINERALS FROM THE CERRO PRIETO GEOTHERMAL SYSTEM: INDICATORS OF TEMPERATURE DISTRIBUTION AND FLUID FLOW
Alan E. Williams and Wilfred A. Elders 1981 8 p refs Presented at the 3rd Symp. on the Cerro Prieto Geothermal Field in Baja California, Mexico, San Francisco, Mar. 1982
(Contract DE-AT03-80SF-11458)
(DE82-001077; CONF-810399-1; Rept-81-9) Avail: NTIS HC A02/MF A01

Paleotemperatures different from the present thermal regime were studied by examining coexisting mineral systems which exchanged their oxygen with the geothermal brines at different rates. Oxygen isotopic compositions were measured in drill cuttings and core and core samples from more than 40 wells. Oxygen isotopic profiles of pore filling calcites in sandstones are a measure of the recent equilibrium temperature distribution. A three dimensional map was developed, showing the equilibrium temperatures in the geothermal field. A mass balance calculation was performed using measured 18O enrichment of the geothermal brine. This calculation implies an overall water; rock volume ratio of approximately 3:1 during the history of the Cerro Prieto system. DOE

N83-16908# Arizona State Univ., Tempe. Dept. of Mechanical Engineering.
PERFORMANCE OF AN EXPERIMENTAL PHOTOVOLTAIC-POWERED HOUSE
Barry W. McNeill and F. John Solman (MIT) 1981 5 p Presented at the Ann. Conf. of the Intern. Solar Energy Soc., Philadelphia, 27-30 May 1981
(Contract DE-AC02-76ET-20279)
(DE82-000662; DOE/ET-20279-158; CONF-810509-41) Avail: NTIS HC A02/MF A01

A utility interactive photovoltaic power system in operation since May of 1980 at a model home is discussed. System, inverter, and cell performance are presented along with some discussion of the economic impact of such a system on the owner's utility bill. By March 1, 1981, the system produced 5463 KWh of energy. The overall system efficiency of just over 5% has held constant. Design modifications made on the inverter improved the inverter efficiency by 10 percentage points and raised the power factor by .15 points. Array reliability improved in the winter with only five array shorts to ground being reported. DOE

N83-16909# Houston Univ., Tex. Dept. of Physics.
LONG TERM SOLAR IRRADIATION HEATING OF BLACK CHROME Final Report
A. Ignatiev 28 Dec. 1981 9 p
(Contract DE-AC03-81SF-11492)
(DE83-000032; DOE/SF-11492-T6) Avail: NTIS HC A02/MF A01

The effect of high solar fluxes (0.1 to 2.0 MW/m(2)) in conjunction with high temperatures (350 to 5000C) on the optical response, chemical composition and microscopic structure of black chrome films was studied by exposing the films to concentrated solar radiation for extended periods of time (10 hours) in air. The optical response of the samples was defined through measurement of their spectral hemispherical reflectance. The samples were mounted on specially constructed holders which had the capability of cooling the sample and the resulting control of the sample temperature under irradiation. Five separate samples were solar irradiated in a solar furnace. DOE

N83-16910# Sandia Labs., Albuquerque, N. Mex.
CHARACTERIZATION AND SUPPORTING RESEARCH FOR IN-SITU COAL-GASIFICATION RESEARCH AND DEVELOPMENT PROJECT PLAN
Stanley L. Love Aug. 1982 38 p refs
(Contract DE-AC04-76DP-00789)
(DE83-000962; SAND-82-0494) Avail: NTIS HC A03/MF A01

Of the remaining problems with undergound coal gasification (UCG) technology, perhaps the most significant is the inability to reliably forecast test results. Experience now indicates that to anticipate test results, one must be able to forecast the evolving shape of the underground reaction zone. Further, the most important factors governing this cavity growth may be the initial site and process conditions. A research plan which is designed to provide the needed UCG characterization in terms of cavity growth as determined by the nature of the UCG site is described. Laboratory and small-scale field investigations are proposed which should: define the characteristics of sites that are suitable for UCG; identify and quantify the key process factors; and develop mathematical models which can be used to forecast site-specific test results. Included are task descriptions and objectives, time scales, and budget estimates. DOE

N83-16911# Boeing Co., Seattle, Wash.
SOLAR PROJECT DESCRIPTION FOR ENVIRONMENTAL PARTNERSHIP, UPPER FREEHOLD TOWNSHIP, MONMOUTH COUNTY, NEW JERSEY
16 Aug. 1982 47 p
(Contract DE-AI01-76CS-31020)
(DE83-001068; SOLAR/1027-82/50) Avail: NTIS HC A03/MF A01

A solar house is described. It is a three-story single family detached residence in New Jersey. It is equipped with a 540 cubic foot vented Trombe wall constructed of concrete filled concrete blocks and glazed with 344 square feet of insulated tempered glass. Heat is also provided by a 168 square foot sunspace of insulated glass. In the loft area is a phase change storage system composed of 32 PSI Thermal-81 phase change storage rods. Auxiliary heating is y a wood-burning stove and a dual-fuel, propane and wood, forced air furnace. A breadbox type hot water preheater is located on the roof. Summer cooling is accomplished by opening windows, doors, and exhaust dampers and operating a whole house ventilation fan. Operation of the solar system and the auxiliary subsystems may involve one or more of 5 modes: collector-to-storage, storage-to-space heating, auxiliary-to-space heating, energy-to-load-summer cooling, and domestic hot water. The house, its solar heating systems, storage, load, operation, on-site performance evaluation instrumentation, and data depicting the solar portion of construction costs are outlined. DOE

N83-16912# Tennessee Valley Authority, Chattanooga. Transportation Projects.
BATTERY TEST PLAN
J. H. Barnett, C. L. Carter, T. W. Blickwedel, and D. E. Todd Jun. 1982 30 p Sponsored by EPRI
(EPRI Proj. RP-1136-5)
(DE83-900053; TVA/PUB-83/5) Avail: NTIS HC A03/MF A01

An approach to testing electric vehicle batteries is described. Each individual module and vehicle battery pack is given an identification that is traceable through its history. Computer-controlled battery capacity testing equipment is used. Two types of testing are performed - acceptance and operational. Records of tests are maintained on computer-generated outputs. The results of the testing is documented in a report on individual battery products of a manufacturer. DOE

N83-16913# Zaininger Engineering Co., San Jose, Calif.
BENEFITS TO UTILITY SYSTEMS OF COPRODUCTION OF METHANOL AND ELECTRICITY Final Report
H. W. Zaininger and D. J. Bell Sep. 1982 66 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. TPS-81-781)
(DE83-900279; EPRI-AP-2587) Avail: NTIS HC A04/MF A01

One potential alternative to petroleum oil for electric power generation is methanol produced by adding a once-through methanol synthesis to coal gasification-combined cycle plants. An initial assessment of the potential benefits of installing methanol and electricity coproduction units was performed. Results indicate substantial potential savings to systems using relatively large quantities of oil-fired generation by adding once-through methanol synthesis to coal gasification-combined cycle units. Although potential savings are less for utility systems using a large percentage of coal-fired generation, total capital requirements for expanding such systems could be reduced, even though capital must be spent for the methanol producing facilities. DOE

N83-16914# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
DESIGN OF A VORTEX-FLOW SOLAR CHEMICAL REACTOR Final Technical Report
Hampton L. Teague and Steve H. Bomar, Jr. Dec. 1981 31 p refs Prepared for Houston Univ.
(Contract DE-AC03-81SF-11492)
(DE83-000031; DOE/SF-11492-T5) Avail: NTIS HC A03/MF A01

A preliminary investigation of a vortex-flow chemical reactor, fired by concentrated solar radiation is discussed. The reactor would be capable of containing gaseous and solid particle reactants in the presence of high-flux radiant thermal energy, leading to chemical reactions which store solar process energy in chemical bonds. The vortex-flow reactor concept appears to offer important technical advantages in process control, compared with other methods such as fluidized beds. Specifically, the flow rates of the entraining gases and the reactant gases can be varied independently in response to changes in power level caused by variations in solar intensity. A model vortex-flow reactor was constructed and operated to determine its control characteristics at room temperature. A preliminary design was developed for a reactor suitable for testing. DOE

N83-16915# Power Math Associates, Inc., Tempe, Ariz.
SECURITY ASSESSMENT OF POWER SYSTEMS INCLUDING ENERGY STORAGE AND WITH THE INTEGRATION OF WIND ENERGY. VOLUME 1: DIGITAL TRANSIENT SIMULATION EFFORT CONSULTING AGREEMENT NUMBER 1 Final Report
P. M. Anderson 30 Jun. 1982 275 p refs
(Contract DE-AC02-77ET-29100)
(DE82-021063; DOE/ET-29100/21-Vol-1) Avail: NTIS HC A12/MF A01

The purpose of the effort reported was to adapt the MOD-2 simulation models for implementation on a digital transient stability program. This has involved: selection of an appropriate host program, examination of the host program interface, analysis of the analog models for digital implementation, FORTRAN coding of the model equations, installation and debugging on the host program, and final model verification. Synchronous machine

equations are analyzed, with particular emphasis on numerical solution. DOE

N83-16916# Ohio State Univ., Columbus. Dept. of Physics.
SALT GRADIENT SOLAR POND DEVELOPMENT Final Report
Carl E. Nielsen 1981 40 p refs
(Contract DE-FG04-77CS-34155)
(DE82-020630; DOE/CS-34155-T1) Avail: NTIS HC A03/MF A01

A research solar pond was constructed. From the operation of this pond and the continuing operation of the Farm Science review pond completed in 1975 important new information on pond performance and operating procedures has been obtained. Work discussed here includes design and construction of the research pond, measurement of energy balance and efficiency, measurements of salinity profiles and their use in determining salt transport rate, study of surface zone growth and the processes responsible for it, study of the processes involved in the interface between convective and gradient zones, tests of heat extraction systems, and measurement and control of water quality. DOE

N83-16917# Perkin-Elmer Corp., Norwalk, Conn.
POLYCRYSTALLINE SOLAR CELL/SUBSTRATE GROWTH BY INTEGRATED VACUUM EVAPORATION Final Report
Donald L. Smith Feb. 1982 35 p refs
(Contract DE-AC02-77CH-00178)
(DE82-017203; SERI/TR-8041-14-T1) Avail: NTIS HC A03/MF A01

GaAs epitaxy on a large-grained substrate would reduce grain-boundary shunting losses in polycrystalline solar cells. In pre-contract work, Fe was selected for its low cost and 1.4% lattice match, and was e-beam evaporated onto 850 to 11000C alumina and Kovar wafers, selected for reasonably good thermal expansion match to GaAs. Fe films developed 30 to 200 micrometers grains with a (211) texture and did not crack or peel upon cooldown. Under the contract, clean, single-crystal Fe surfaces for GaAs growth studies were generated by epitaxial growth of Fe onto 3000C GaAs(211); but the reverse process, GaAs growth on Fe (by vacuum deposition from Ga and As4) produced polycrystalline Ga-As-Fe mixed phases. The success of Fe epitaxy on GaAs is attributed to the availability of Ga and As at the interface only as the compound GaAs, which raises the activation energy for the formation of mixed phases. Fe passivation by NH3 and H2S exposure was tried unsuccessfully, although H2S did passivate Fe against As4. Various closely lattice-matching materials were vacuum-deposited on the Fe as buffer layers prior to GaAs growth. AlAs and Ge formed mixed phases with the Fe. DOE

N83-16918# General Electric Co., Schenectady, N. Y. Advanced Energy Programs Dept.
DEVELOPMENT OF ADVANCED BATTERIES FOR UTILITY APPLICATION Final Report, 1 Jun. 1979 - 15 Jun. 1981
John A. Bast and S. P. Mitoff Sep. 1982 250 p refs
(EPRI Proj. 128-6)
(DE82-906459; EPRI-EM-2579) Avail: NTIS HC A11/MF A01

The development of Beta (sodium-sulfur) batteries for utility load leveling applications is discussed. A cell that is cost effective in the battery configuration for utility application was designed. The cell electrolyte is a beta''-alumina ceramic, change was made from beta alumina to beta''-alumina in the electrolyte. The ceramic composition and the process of the internal seal were developed. Generation VIII beta''-alumina shows no assymmetric polarization, relatively low aging rates, no corrosion on the sulfur side, and substantially less blackening than other beta''-alumina tubes. Chromized steel container materials with duplex coating consistently shows excellent performance. Cells with beta''-alumina, which achieve life of 752 Ah/cm(2) are tested. DOE

N83-16919# United Technologies Corp., East Hartford, Conn.
EVALUATION OF INDUSTRIAL ADVANCED HEAT RECOVERY/ THERMAL ENERGY STORAGE SYSTEMS Final Report
H. R. McChesney, R. W. Bass, A. M. Landerman, T. N. Obee, and C. T. Sgamboti Sep. 1982 66 p
(EPRI Proj. 1275-1)
(DE82-906475; EPRI-EM-2573-Vol-1-Exec-Summ) Avail: NTIS HC A04/MF A01

The investigation has involved: examining plant and process energy data acquired during on-site visits to 12 industrial plants from which 24 candidate applications were identified where thermal energy storage (TES) would be necessary either to make possible or to enhance the recovery and reuse of industrial waste heat; compiling cost and performance data for commercially available (1985) equipment to recover, store, and transfer waste heat between source and sink processes on demand: and assessing the economic benefits, possible energy savings, and utility impact if proposed systems were installed and operated in industrial plants. DOE

N83-16920# Boeing Engineering and Construction Co., Seattle, Wash.
THE 1-MW(TH) SOLAR-THERMAL CONVERSION FULL-SYSTEM EXPERIMENT
D. H. Bartlett Aug. 1982 71 p
(EPRI Proj. 1509-1)
(DE82-906454; EPRI-AP-2435-SY) Avail: NTIS HC A04/MF A01

Progress made during the first phase effort of the Solar Thermal Full-System Experiment is summarized. This is one of a number of projects in the Solar-Thermal Subprogram involved with the development of solar central receiver hardware and systems for future use by utilities. The main emphasis is on systems that use Brayton-Cycle (gas turbine) equipment. The project summarized involves the planning and design of a complete Brayton-Cycle solar central receiver experimental system that would include all components of a commercial-size electric utility solar power plant. The objective of the overall project is to demonstrate the technical feasibility of a complete Brayton-Cycle, solar-fossil hybrid central receiver system. Major objectives of the Phase I effort summarized are to plan and design the experiment in detail and to organize a utility Test and Operating Group that would be directly involved in the development and operation of the experiment. DOE

N83-16921# California Energy Commission, Sacramento.
COGENERATION IN MUNICIPALITIES. PROCEEDINGS FROM WORKSHOPS FOR LOCAL GOVERNMENTS AND MUNICIPAL UTILITIES
Sue Patterson, ed. Jan. 1982 71 p refs Workshops held 18 Nov., 1981, Sacremento, Calif. and 4 Dec. 1981, Los Angeles
(DE82-905758; P-500-82-005) Avail: NTIS HC A08/MF A01

The energy situation, cogeneration systems, cogeneration potential, advantages of cogeneration, the California Energy Commission projects, issues in development, and the reasons cities should be interested are reviewed. DOE

N83-16922# California Univ., Livermore. Lawrence Livermore Lab.
ENERGY AND TECHNOLOGY REVIEW
I. F. Stowers, ed. Jan. 1982 36 p refs
(Contract W-7405-eng-48)
(DE82-011840; UCRL-52000-82-1) Avail: NTIS HC A03/MF A01

Three research programs at Lawrence Livermore Laboratory are described. The solid-state microscope, specifically designed for computer input, enables automated high-resolution population screening for blood-cell abnormalities or early signs of cancer. Nonmedical applications appear possible in powder metallurgy, geology, and semiconductor fabrication. The studies of ion-atom collisions led to improved atomic-structure measurements, new techniques for determining elemental composition, and better X-ray detector calibrations. A new and promising source of high-power laser radiation has characteristics that may make it feasible for the production of fusion power on a commercial scale. DOE

N83-16923# Royal Inst. of Tech., Lund (Sweden).
ELECTRIC LOAD OF RESISTANCE HEATED ONE-FAMILY HOUSES: AN EMPIRIC ANALYSIS
Lennart Larsson May 1981 31 p refs In SWEDISH

(DE82-901536; LUTMDC/TMVK-3095/1-24(1981)) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

An analysis is presented of the electric load statistics of 33 one-family houses in a suburban area in Gothenburg, Sweden. The loads from electric space heating, were measured. The mean load was recorded every 15 minutes. Comparison is made to two theoretical models. DOE

N83-16924# Science Applications, Inc., Oak Ridge, Tenn.
EVALUATION OF UTILITY HOME-ENERGY-AUDIT PROGRAMS: A WISCONSIN EXAMPLE
Stephen Grady and Eric Hirst Oak Ridge, Tenn. ORNL Mar. 1982 41 p refs
(Contract W-7405-eng-26)
(DE82-008134; ORNL/CON-88) Avail: NTIS HC A03/MF A01

In February 1978, the Wisconsin Power & Light Company (WPL) offered its residential gas-space-heating customers free onsite energy audits. Between then and June 1980, WPL audited about 19 thousand homes, one-fourth of their gas customers. The audit program included an evaluation of natural gas consumption records, the need for specific weatherization measures (as determined during their energy audits), and customers reports of their demographic characteristics and recent energy conservation practices and measures. The two groups differed significantly only with respect to conservation measures; this difference was probably due, in part, to the 1978 audits. Regression equations were developd to explain natural gas use for the two heating seasons after the 1978 audit. The results showed the importance of floor area, age of house, household income, number of occupants, and temperature setting on gas use. DOE

N83-16925# Los Alamos Scientific Lab., N. Mex.
ENERGY OPTIMIZATION IN DOD FACILITIES
Fred Roach, Christina Kirschner (New Mexico Univ., Albuquerque), and Richard Salmon (New Mexico Univ., Albuquerque) 1981 10 p refs Presented at the 4th Miami Intern. Conf. on Alternative Energy Sources, Miami Beach, Fla., 14-16 Dec. 1981 Submitted for publication
(Contract W-7405-eng-36)
(DE82-008108; LA-UR-82-522) Avail: NTIS HC A02/MF A01

A static linear programming formulation (management tool) of energy optimization problems on military bases was developed to assist each of the military services in their planning activities and budgetary allocation decisions. Several objective functions were defined, resulting in two types of model capabilities; minimization of capital costs (investments) subject to a number of energy and dollar constraints and the maximization of energy savings subject to capital and operating fund budget restrictions and minimum energy performance goals. The management tool defines various levels of aggregation in terms of: (1) geographical boundaries; (2) end use energy demand; (3) building type characteristics; (4) conservation options; (5) renewable energy and alternative fuel technologies; and (6) a limited set of advanced energy technology options. DOE

N83-16926# Brookhaven National Lab., Upton, N. Y.
MODELING ENERGY/ECONOMY INTERACTIONS FOR CONSERVATION AND RENEWABLE ENERGY-POLICY ANALYSIS
P. J. Groncki 1981 31 p refs Presented at the 3rd Ann. Meeting of the Intern. Assoc. of Energy Econ., Houston, Tex., 12-13 Nov. 1981
(Contract DE-AC02-76CH-00016)
(DE82-009159; BNL-30931; CONF-811189-1) Avail: NTIS HC A03/MF A01

Energy policy and the implications for policy analysis and the methodological tools are discussed. The evolution of one methodological approach and the combined modeling system of the component models, their evolution in response to changing analytic needs, and the development of the integrated framework are reported. The analyses performed over the past several years are summarized. The current philosophy behind energy policy is discussed and compared to recent history. Implications for current policy analysis and methodological approaches are drawn. DOE

N83-16927# Los Alamos Scientific Lab., N. Mex.
PENETRATION FOR FOUR SOLAR TECHNOLOGIES IN ELECTRIC UTILITIES AND THE ENVIRONMENTAL BENEFITS
Ronald J. Sutherland Dec. 1981 42 p refs
(Contract W-7405-eng-36)
(DE82-010864; LA-9149-TASE) Avail: NTIS HC A03/MF A01

A structural model of a public utility to estimate the penetration by four solar technologies: wind, biomass, photovoltaics, and solar thermal; for electric installed capacity and power generated is examined. The displacement of coal plants implies a displacement of their air emissions, such as sulfur dioxide, oxides of nitrogen, and particulate matter. It is concluded that solar thermal, photovoltaics, and biomass fail to penetrate significantly by the end of this century in any Federal region. Wind energy penetrates the electric utility industry in several regions during the 1990s. Displaced coal and nuclear generation are also estimated by region, as are the corresponding reductions in air emissions. A moderate displacement of sulfur dioxide and the oxides of nitrogen is estimated to occur by the end of this century, and significant lowering of these emissions should occur in the early part of the next century. DOE

N83-16928# Battelle Columbus Labs., Ohio.
BIOMASS COGENERATION: A BUSINESS ASSESSMENT
John C. Skelton Nov. 1981 37 p refs
(Contract DE-AC02-79CS-30159)
(DE82-011773; WSUN-113) Avail: NTIS HC A03/MF A01

The biomass cogeneration was reviewed. The business assessment is based in part on discussions with key officials from firms that have adopted biomass cogeneration systems and from organizations such as utilities, state and federal agencies, and banks directly involved in a biomass cogeneration project. The guide is organized into five chapters: biomass cogeneration systems, biomass cogeneration business considerations, biomass cogeneration economics, biomass cogeneration project planning, and case studies. DOE

N83-16929# Gesellschaft fuer Elektrometallurgie m.b.H., Duesseldorf (West Germany).
REPLACEMENT OF LUMPY CHROME ORE BY AGGLOMERARED ORE CONCENTRATES AND LOWERING OF SPECIFIC POWER CONSUMPTION AND IMPROVEMENT OF Cr YIELD BY MEANS OF IMPROVED SLAG COMPOSITION IN THE PRODUCTION OF HC FERROCHROME Final Report, Mar. 1981
Hans-Joachim Retelsdorf, Rudolf Fichte, Friedrich Breuer, and Heinz Zimmermann Bonn Bundesministerium fuer Forschung und Technologie Jun. 1982 16 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-084; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 3,50

Improved slag compositions for the FeCr 4 to 6 % C process were developed in order to increase the Cr yield and lower the specific power consumption. Furthermore, replacement of lumpy ore in the charge by agglomerated Cr-ore-fines or concentrates in the form of pellets and briquettes was tested. Experiments were performed in a 70 kW and a 300 kW arc furnace. Two different slag compositions were tested. The high-MgO slag type proved suitable. The specific power consumption and the Cr yield depends to a large extent on the type of Cr ore and on the agglomeration process. Cr ore pellets can be used up to 65% in the ore charge, but briquettes only up to 25% to replace lumpy ores without causing higher Cr losses in the slag. Author (ESA)

N83-16930# AEG-Telefunken, Nurenberg (West Germany).
HEATING OF DOMESTIC WATER BY WASTE HEAT RECOVERY FROM HOUSEHOLD REFRIGERATING EQUIPMENT Final Report, Sep. 1981
Josef Reil, Bernhard Kaster, and Manfred Wegner (Forschungsstelle fuer Energiewirtschaft) Bonn Bundesministerium fuer Forschung und Technologie Sep. 1982 218 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer

Forschung und Technologie
(BMFT-FB-T-82-156; ISSN-0340-7608) Avail: NTIS HC A10/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 38,50

Heat from a 370 l deep freeze was used to heat water in a 250 l boiler. Both units were made from mass produced components. Tests show that the functions of cooling and deep freezing units can be effectively combined with one warm water boiler. The necessary expenditure for the appliance is, however, only economical with deep freezing units because with normal domestic refrigerators the amount of waste heat is too small. The economy of the unit could be considerably increased by the development of a mass produced motor compressor with a sufficiently large oil cooler to accomplish an optimum thermal insulation of the motor compressor surface area. Author (ESA)

N83-16931# Balke-Duerr A.G., Ratingen (West Germany). Hauptbereich Rueckkuehltechnik.
TESTS ON A PILOT PLANT FOR REHEATING DESULFURIZED FLUE GASES WITH THE HELP OF HEAT PIPES Final Report, Oct. 1981
Wolfgang Schug Bonn Bundesministerium fuer Forschung und Technologie Feb. 1982 34 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-82-157; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 7,10

Desulfurized flue gases were reheated with a heat pipe heat exchanger. Finned heat pipes, with a coating or made of high quality steel were subjected to different operating conditions for 1000 hr. The coating proved to be unsuitable for heat transfer because it swells and detaches itself from the background material. The high quality steels showed pitting and surface corrosion. The possibilities of cleaning were also studied to prevent deposits forming on the heat pipes, but no solution was found.
Author (ESA)

N83-16932# Columbia Gas Corp., Ohio. System Service Div.
RESEARCH, DEVELOPMENT AND DEMONSTRATION OF AN ADVANCED ACTUATED HEAT PUMP Annual Report, Oct. 1980 - Sep. 1981
F. B. Cook, A. R. Montero, and E. M. Purvis, Jr. Apr. 1982 58 p refs
(Contract GRI-5080-341-0344)
(PB82-254590; GRI-80/0137) Avail: NTIS HC A04/MF A01 CSCL 13A

The research, development and demonstration of the basic heat pump refrigeration circuit and the heat exchange interface with the controlled and ambient environments in both cooling and heating modes of operation are discussed. The basic refrigeration circuit uses a high efficiency absorption process with a novel absorbent/refrigerant pair. A full sized breadboard model of the refrigeration cycle was designed and fabricated. A test program is underway. In addition to the basic cycle development and test program, four hardware development and four supporting data development subcontract programs are underway. Hardware development includes interface heat exhangers, recuperative heat exchangers, a solution pump and an automatic control system.
GRA

N83-16933# Commission of the European Communities, Luxembourg.
INVESTIGATION OF LATENT HEAT STORAGE MATERIALS IN THE MEDIUM AND HIGH TEMPERATURE RANGE Final Report
D. Heine, F. Heess, and D. Steiner Aug. 1982 87 p refs Transl. into ENGLISH of the mono. "Utersuchung von Mittel- und Hochtemperaturlatentwaermespeicher-Materialien" Brussels, Commission of the European Communities, 1981 p 1-95 Prepared in cooperation with Inst. fuer Kerntechnik und Energiewandlung e.V., Stuttgart, West Germany
(PB82-259896; EUR-7065-68) Avail: NTIS HC A05/MF A01 CSCL 10C

Experimental investigations are carried out of the long term behavior of latent heat storage materials for use in the temperature ranges 200 to 450 degrees C and 700 to 900 degrees C. These investigations comprise the corrosion of structural materials together with promising storage materials and the thermal stability and the melting and freezing behavior of these storage materials. From the corrosion tests the mass loss of sheet metal samples is measured and thickness reduction and corrosion rate are calculated. Furthermore the corrosion type is determined using optical and scanning electron microscopes. During cyclic tests melting and freezing curves are continually measured. Thereby the thermal stability of the storage materials as a function of melting and freezing is determined.
GRA

N83-16934# Accumulation-Fabrik A.G., Soest (West Germany).
BIPOLAR LEAD ACCUMULATOR CELL WITH HIGH ENERGY DENSITY Report, Aug. 1978 - Nov. 1980
Reiner Kiessling Aug. 1982 83 p refs Transl. into ENGLISH of the mono. "Bipolare Bleiakkumulatorenzelle hoher Energiedichte" West Germany, Nov. 1980 Sponsored by Bundesministerium fuer Forschung und Technologie
(PB82-258757; BMFT-FB-T-80-115) Avail: NTIS HC A05/MF A01 CSCL 10C

A cell design using bipolar electrodes was proposed for increasing the energy density of the familiar PbO2/H2SO4/Pb system. Weight reductions have been achieved by improving several details of the battery construction and grid design, and reducing the amount of electrolyte. Requirements for low-maintenance have been equally fulfilled by reducing water consumption. Lead-coated Cu was chosen for the grid of the negative electrode and lead-coated Al for the grid of the positive electrode. An 80 to 100 micrometers lead-coating was found to offer sufficient protection for the Cu-grid because anodic corrosion of the negative electrode could be discounted. Cu itself, in contact with negative active material remains stable with the normal range of electrochemical potential. Al, as the positive grid, required a protective lead-coating of at least 250 micrometers, without pinholes or other defects or anodic corrosion could be intense.
GRA

N83-16935# Wisconsin Univ., Madison. Inst. for Environmental Studies.
AN ASSESSMENT OF WIND CHARACTERISTICS AND WIND ENERGY CONVERSION SYSTEMS FOR ELECTRIC UTILITIES
Carel C. DeWinkel Jun. 1982 175 p refs
(Contract EPA-R-803971)
(PB82-258971; EPA-600/3-82-066) Avail: NTIS HC A08/MF A01 CSCL 10B

Evaluation of wind speed data from 12 airport sites in Wisconsin, Minnesota, Iowa, and Illinois and from five Coast Guard stations along Lakes Superior and Michigan, indicates annual average wind speeds of 4.5 to 6 m/s and wind power densities of 100 to 200 W per sq m at 7 m height. The economic analysis of wind energy conversion systems (WECS) applied to the Dairyland Power Cooperative (DPC) system indicates that it can be economically attractive for the DPC to install WECS in the 1980's. A preliminary study of WECS in combination with directly controlled water heaters shows that this combined system may delay conventional generating capacity additions longer than will controlled heaters only.
Author (GRA)

N83-16936# Commission of the European Communities, Luxembourg.
INDUSTRIAL TECHNOLOGY FOR ECONOMIC AND VIABLE ENCAPSULATION FOR LARGE SOLAR PANELS Final Report
J. Anguet (RTC, Caen, France) and Y. Salles (RTC, Caen, France) 1981 21 p Transl. into ENGLISH of the mono. "Technologie Industrielle d'Encapsulation Economique et Fiable pour Panneaux Solaires de Grandes Dimensions" France, 1981
(PB82-259839; EUR-7163-FR) Avail: NTIS HC A02/MF A01 CSCL 10B

The laminated glass technology used in buildings and car

windscreens is applied to the encapsulation of solar panels so as to form a glass-polyvinylbutyral-glass 'sandwich'. Based on small scale experimental panels, the following studies were made: (1) adhesion techniques; (2) structure studies to find the most suitable means for maintaining the mechanical stability of the cells; (3) types of connections for the solar panels; and (4) climatic tests and humidity resistance. Mechanical and climatic tests with the minimodules gave encouraging results, whereupon larger scale models were designed. The results obtained with these confirmed those obtained with the minimodules. GRA

N83-16937# Johns Hopkins Univ., Laurel, Md.
OCEAN THERMAL ENERGY AT THE JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY Quarterly Report, Jan. - Mar. 1982
1982 42 p refs
(PB82-257536; JHU/APL/OQR/82-1) Avail: NTIS HC A03/MF A01 CSCL 10A

An ocean thermal energy conversion (OTEC) pilot plant conceptual design review is given. OTEC methanol production from coal is discussed. A review of electrolyzer development programs and requirements is given. Financial and legal considerations in OTEC implementation, potential navy sites for GEOTEC system, hybrid geothermal-OTEC power plants, single-cycle performance estimates, and supervision of testing of a pneumatic wave energy conversion system are discussed. GRA

N83-16938# National Bureau of Standards, Washington, D.C.
ECONOMIC EVALUATION OF SOLAR ENERGY SYSTEMS IN COMMERCIAL BUILDINGS: METHODOLOGY AND CASE STUDIES Final Report
Rosalie T. Ruegg, G. Thomas Sav, Jeanne W. Powell, and E. Thomas Pierce Jul. 1982 207 p refs Sponsored in part by DOE
(PB82-260456; NBSIR-82-2540) Avail: NTIS HC A10/MF A01 CSCL 13A

A comprehensive economic optimization model for evaluating the economic feasibility of active solar energy systems to provide service hot water and combined space heating and service hot water in commercial buildings is given. The model is demonstrated in a number of case studies for office buildings and retail stores. Data and assumptions for use in the model are compiled for the selected case studies. Using these data, the model is applied to estimate present value net savings (or net losses) of the solar energy systems over a 20 year life cycle. Break even values for hot water loads, solar energy systems costs, and current and future energy prices are also calculated to determine the minimum conditions under which the solar energy systems become cost effective for the selected buildings. Author (GRA)

N83-16939# Swedish Council for Building Research, Stockholm.
SOLAR DISTRICT HEATING WITH EVACUATED COLLECTORS: FIRST YEAR EXPERIENCE OF THE KNIVSTA PLANT
Elisabeth Kjellson, Bengt Perers, Heimo Zinko, and Lars Astrand 1981 49 p
(PB82-262114; D10-1982; ISBN-91-540-3721-2) Avail: NTIS HC A03/MF A01 CSCL 13A

The experience gained during the summer enable some practical demands to be placed on solar collectors, namely: it must be possible to easily replace a solar collector without emptying the system; it must be easy to bleed the system; solar collectors must be able to withstand overheating due to boiling; and obvious leakage risks must be eliminated. There is no doubt that not all types of evacuated solar collectors fulfill these requirements and that further development is essential before large-scale installations with rational operation can be considered. GRA

N83-16940# Mueller Associates, Inc., Baltimore, Md.
THERMAL PERFORMANCE CASE STUDIES FOR RESIDENTIAL SOLAR HEATING AND COOLING SYSTEMS Final Report
Angela H. Cremeans and Robert E. Hedden Jun. 1981 167 p refs Sponsored in part by HUD
(Contract NBS-79-3534)
(PB82-260100; NBS/GCR-82-397; MAI-213) Avail: NTIS HC A08/MF A01 CSCL 13A

Five case studies on thermal performance of selected solar system designs which served as a vehicle for examining the applicability of the draft performance criteria for solar heating and cooling systems in residential buildings are given. The purpose was to identify shortcomings in the draft version of the performance criteria by means of attempting to implement the criteria. Those aspects of the criteria that require revision were highlighted. Author (GRA)

N83-16941# National Oceanic and Atmospheric Administration, Washington, D. C. Office of Ocean Minerals and Energy.
OCEAN THERMAL ENERGY CONVERSION: ENVIRONMENTAL EFFECTS ASSESSMENT PROGRAM PLAN, 1981 - 1985
Jun. 1982 63 p refs
(PB82-258047; NOAA-82072903) Avail: NTIS HC A04/MF A01 CSCL 10B

A generic plan regarding the environmental effects of ocean thermal energy conversion (OTEC) is discussed. The plan has the primary objective of obtaining the environmental information and knowledge required to allow the commercial development of OTEC to the maximum extent that is compatible with acceptable environmental risk. This plan describes the program of research for FY 1981 to 1985 that is necessary to begin to assess the effects on the environment of ocean thermal energy conversion facilities and plantships. GRA

N83-16942# Pope, Evans, and Robbins, Inc., New York.
CONGENERATION FEASIBILITY: OTIS ELAVATOR COMPANY AND POLYCHROME CORPORATION Final Report
Herbert Fox May 1982 118 p Sponsored in part by Otis Elevator Co. and Westchester County, N.Y.
(PB82-263526; NYSERDA-82-17) Avail: NTIS HC A06/MF A01 CSCL 10B

An investigation of the technical and economic feasibility of cogenerating electric and thermal power at two manufacturing plants (Otis Elevator Company and Polychrome Corporation) located on neighboring properties in Yonkers, NY is discussed. Existing electrical and steam producing equipment and energy consumption date are summarized. Alternative cases examined include electrical energy generation, electrical energy generation with waste heat recovery and a combined cycle case. Also reported are life cycle cost economic evaluations including simple payback period and return on investment indices. While it was concluded that cogeneration of heat and electricity at these industrial plant sites would not be economically viable, this detailed study provides valuable insights. GRA

N83-16943# Brooklyn Union Gas Co., N. Y.
LANDFILL GAS TO ELECTRICITY DEMONSTRATION PROJECT Final Report
A. J. Giuliani and L. A. Cagliostro Mar. 1982 102 p refs Sponsored in part by DOE
(PB82-255290; NYSERDA-82-2; Rept-109/ET-FUC/79) Avail: NTIS HC A06/MF A01 CSCL 21D

Medium Btu methane gas is a naturally occurring by product of anaerobic digestion of landfilled municipal solid waste. The energy potential of landfill gas in New York State is estimated to be 61 trillion Btu's per year or the equivalent of 10 percent of the natural gas used annually in the State. The 18-month Landfill Gas to Electricity Demonstration Project conducted at the Fresh Kills Landfill in Staten Island, New York conclusively demonstrated that landfill gas is an acceptable fuel for producing electricity using an internal combustion engine/generator set. Landfill gas proved to be a reliable and consistent fuel source during a six-month field test program. Engine exhaust emissions were determined to be comparable to that of natural gas and no unusually high corrosion rates on standard pipeline material were found. GRA

N83-16944# Mechanical Technology, Inc., Latham, N. Y.
RANKINE/RANKINE CYCLE GAS-FIRED HEAT PUMP Final Report, Mar. 1979 - Mar. 1982

Emil Enbar, Robert Moriarty, and T. Ivsan 30 Jun. 1982 267 p refs Sponsored in part by New York State Energy Research and Development Authority, Albany
(Contract GRI-5011-341-0149)
(PB82-254640; MTI-82TR-3; GRI-82/0014) Avail: NTIS HC A12/MF A01 CSCL 13A

A Rankine/Rankine cycle gas-fired heat pump was developed for residential application. The system consists of two rotating elements: a high-speed turbomachine core and a low-speed assembly, which includes a rotating vapor generator and heat exchangers. Inherent in the rotation of these components is the elimination of separate pumps, fans, reversing valves, and expansion valves. One Rankine cycle, the power cycle, drives the turbine and gives up its excess heat to the service air. The second Rankine cycle, the refrigerant cycle, is pressurized by a turbine-powered centrifugal compressor. The dual-cycle system uses two organic heat transfer fluids. The power cycle uses a developmental, moderate-temperature fluid (designated Fluid B), and the refrigeration cycle uses Freon R-113. GRA

N83-16945# Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Stuttgart (West Germany). Inst. fuer Bauphysik.
HEAT ENERGY CONSUMPTION AND INTERMITTENT HEATING
Norbert Koenig and Christian Kupke Aug. 1982 49 p refs Transl. into ENGLISH of a German mono., Aug. 1980 Original language document announced as N81-24580 Sponsored in part by Bundesministerium fuer Forschung und Technologie, Bonn
(PB82-255159; BMFT-FB-T-80-072) Avail: NTIS HC A03/MF A01 CSCL 13A

A quantitative assessment of the possible reduction in space heating energy consumption when using an intermittent heating mode as compared to a continuous heating mode is offered. In situ measurement methods used in rooms with different heat storage capacity and different heating systems or heating appliances are described. A variation on energy consumption is presented. A comparison of experiment with calculations indicates that in an ordinary residence an energy savings of 10 to 35 percent can be achieved by employing an intermittent heating mode, depending on the type of wall construction and the number of hours various rooms are in use. Moreover, for the heating of offices and factories, the use of electronic control systems can lead to savings of 50 percent in heat energy consumption. GRA

N83-16946# Fachhochschule, Esslingen (West Germany). Lab. fuer Lueftungs- und Klimatechnik.
SOLAR ENERGY PLANT AS A COMPLEMENT TO A CONVENTIONAL HEATING SYSTEM: MEASUREMENT OF THE STORAGE AND CONSUMPTION OF SOLAR ENERGY Final Report, 1 Oct. 1977 - 30 Sep. 1978
E. Doering and W. Lippe Aug. 1982 49 p refs Transl. into ENGLISH from the mono. "Solarenergieaniage zur Engaenzung einer Konventionellen Heizung- Messung der Einspeicherung und des Verbrauchs von Solarer Waermeenergie" West Germany, Sep. 1980 Sponsored in part by Bundesministerium fuer Forschung und Technologie, Bonn
(PB82-255209; BMFT-FB-T-80-079; BMFT-03E5060A/ETS8001A) Avail: NTIS HC A03/MF A01 CSCL 13A

The technical and economic performances of a complementary solar heating installation for a new swimming pool added to a two-floor dwelling were examined after measurements were taken over a period of 12 months and analyzed. In particular, the heat absorption and utilization were measured and modifications were carried out to improve pipe insulation and regulation of mixer valve motor running and volume flow. The collector system efficiency was evaluated at 15.4%, the proportion of solar energy of the total consumption being 6.1%. The solar plant and the measuring instruments are described and recommendations are made for improved design and performance, including enlargement of the collector surface area, further modification of the regulation system, utilization of temperature stratification in the storage tanks and avoiding mutual overshadowing of the collectors. GRA

N83-16947# Thermo Electron Corp., Waltham, Mass.
OPEN-CYCLE VAPOR COMPRESSION HEAT PUMP Annual Progress Report
F. E. Becker and A. E. Ruggles 1981 81 p
(Contract GRI-5011-342-009)
(PB82-262569; TE4224-239-82; GRI-81/0059) Avail: NTIS HC A05/MF A01 CSCL 13A

A prototype gas-fired steam heat pump was developed. The system utilizes a dry screw compressor driven by a 500-hp natural gas industrial engine. The system can recompress 10,000 lb per hr of clean steam over a 3 to 1 pressure ratio. The fuel consumption of this system is approximately 50 percent that of a direct-fired boiler. A similar size system capable of operating with contaminated steam is also being developed. GRA

N83-16948# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
A HIGHLY EFFICIENT COLLECTOR FOR SMALL SOLAR ENERGY INSTALLATIONS
E. Obermayr, W. Molt, D. Schneller, and K. Speidel Aug. 1982 72 p Transl. into ENGLISH of the mono. "Hochleistungskollektor fuer Sonnenenergie-Kleinanlagen" Bonn, Sep. 1981 p 1-100 Original language document available as N82-15538 Sponsored in part by Bundesministerium fuer Forschung und Technologie
(PB82-255191; BMFT-FB-T-81-156) Avail: NTIS HC A04/MF A01 CSCL 10A

Highly efficient collectors to be used for small solar powered facilities (solar cooling processes and solar powered facilities for mechanical or electric energy production) were developed. A series of preliminary investigations and laboratory tests were performed, which form the basis of collector designs. Due to the results of the performed tests it was decided to develop vacuum flat plate collectors instead of concentration on collectors as an alternative version in this special form of applications. The function of this collector is different, as the working medium is evaporated within the collector itself; the collector is an evaporator. Different designs have been planned and investigated. Prototypes of direct evaporation collectors have been constructed and tested. GRA

N83-16949# Commission of the European Communities, Luxembourg.
INVESTIGATION AND DEVELOPMENT OF SYSTEMS FOR THE STORAGE OF THERMAL ENERGY IN THE TEMPERATURE RANGE FROM -25 DEG C TO +150 DEG C Final Report
P. Eckerlin, A. Klopfer, and J. Schroeder Aug. 1982 143 p refs Transl. into ENGLISH of "Untersuchung und Entwicklung von Systemen zur Speicherung Thermischer Energie im Temperaturbereich Zwischen -25 C und +150 C" Philips G.m.b.H., Aachen, 1980
(PB82-255258; EUR-6936) Avail: NTIS HC A07/MF A01 CSCL 10B

Water, some salt hydrates and eutectic mixtures of the two with high heats of fusion and melting points between -50 and +130C were studied for the purpose of storing low-grade heat in residential energy systems. About 30 of these were selected and flexible flat-plate storage containers specially developed for them performed well over long periods in the laboratory. Over 30 reverisble chemical reactions were also studied, all but one based on gas/solid or gas/liquid interaction. Chemical heat pump systems using heat from ambient air or soil were also studied. A system with moist soil as a storage medium surrounded by a layer of dry earth or foam insulation was discussed. GRA

N83-16950# Deutsche Automobilgesellschaft m.b.H., Esslingen (West Germany).
DEVELOPMENT OF GAS-PHASE METALLIZED PLAQUES FOR ELECTRODES OF STORAGE BATTERIES, IN PARTICULAR FOR NICKEL OXIDE ELECTRODES Final Report
R. Linkohr and H. Schladitz Aug. 1982 75 p refs Transl. into ENGLISH of "Entwicklung von Gasphasenmetallisierten Feruestkoerpern fuer Elektroden Alkalischer Batterien, Insbesondere von Nickeloxid-Elektroden" Jun. 1981 87 p Sponsored by Bundesministerium fuer Forschung und Technologie

(PB82-255431; BMFT-FB-T-81-053) Avail: NTIS HC A04/MF A01 CSCL 10B

Nickel oxide-electrode plaques for alkaline batteries have been developed by carbon vapor deposition plating fiber plaque substrates with nickel from nickelcarbonyo. Carbon felt proved to be a suitable substrate and large (22 x sq 15 sq cm) and thick 3 - 5 mm) plaques could be made from this material. Three metallization devices were constructed, one of which allowed continuous processing with carbonyl gas flowing through the felt; this improved evenness of nickel distribution. The physical properties of the plaques - structure, electric resistance, heat conduction, gas permeation - approximated by simple models and the corresponding calculations were compared with measurements. Nickel oxide electrodes were made from the plaques and were cycled in half-cell arrangements. The project goals concerning nickel sayings, capacity per unit area and current capability were reached. GRA

N83-17399*# Alabama A & M Univ., Normal. Dept. of Engineering Technology.

AN ANALYSIS OF NICKEL CADMIUM BATTERIES

J. B. Turner, Jr. *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 11 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 10C

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N83-16951*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

MULTIPLE-EVENT AIRPLANE NOISE ANNOYANCE

Cleamans A. Powell Jan. 1983 34 p refs
(NASA-TP-2101; L-15517; NAS 1.60:2101) Avail: NTIS HC A03/MF A01 CSCL 13B

The annoyance of sessions of airplane noise which contained different noise levels and numbers of flyovers was investigated. The time of occurrence of the high noise level flyovers in the sessions did not significantly affect annoyance, but annoyance increased with the number of such flyovers. Annoyance decreased with test session duration but increased with the total number of flyovers in the test sessions. It is found that the results support an average energy model better than a total energy model, the annoyance decay model, or the dB(A) peak concept. E.A.K.

N83-16952*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AIRBORNE MEASUREMENTS OF LAUNCH VEHICLE EFFLUENT: LAUNCH OF SPACE SHUTTLE (STS-1) ON 12 APRIL 1981

Gerald L. Gregory, David C. Woods, and Daniel I. Sebacher Jan. 1983 74 p refs
(NASA-TP-2090; L-15494; NAS 1.60:2090) Avail: NTIS HC A04/MF A01 CSCL 13B

Launch vehicle effluent environmental impact activities from the first space shuttle (STS-1) included airborne measurements within the exhaust cloud from about 9 min after launch (T + 9) to T + 120 min. Measurements included total hydrogen chloride (gaseous plus aqueous) concentrations, particulate concentrations, temperature, and dewpoint temperature. The airborne measurements are summarized. The physical growth and behavior of exhaust clouds is presented as well as the results of laboratory analysis of elemental composition of particulate samples collected by the aircraft. Observed results from the STS-1 launch are compared with earlier Titan III results. Shuttle effluent concentrations are found to be within the range of Titan III observations. S.L.

N83-16953# Louisiana State Univ., Baton Rouge. Coastal Studies Inst.

THE EFFECTS OF WEATHER SYSTEMS, CURRENTS AND COASTAL PROCESSES ON MAJOR OIL SPILLS AT SEA

Stephen P. Murray 1982 63 p refs
(Contract N00014-75-C-0192)
(AD-A120221; TR-343) Avail: NTIS HC A04/MF A01 CSCL 08/3

Review of the effect of weather phenomena on continental shelves and coastal waters has clearly demonstrated their dominant role in forcing the motion of these waters. As the response of oil to wind forcing will be largely controlled by the type of weather characteristic of different climatic regions throughout the world, the paper will begin with a brief summary of the time and length scales of weather systems. Next, the oil dispersal problem will be discussed in terms of the physical and chemical properties of oil on the sea surface and then the geophysical processes (currents, tides, etc.) that experience has shown us to be important will be considered. Hydrodynamic details will not be emphasized, but rather case studies from major oil spills will next be called on to demonstrate the role of basic physical processes in determining oil motion. A brief review of the major types of models currently employed to aid in understanding or predicting oil spill movement will then be presented; it will be followed by a summary and evaluation of what I see to be the role physical oceanography will play in future oil spill incidents. GRA

N83-16954# State Univ. of New York, Stony Brook. Marine Sciences Research Center.

COAL-WASTE ARTIFICIAL-REEF PROGRAM, PHASE 3. VOLUME 2: COMPREHENSIVE REPORT

J. H. Parker, P. M. J. Woodhead, and I. W. Duedall Nov. 1981 451 p refs Sponsored by EPRI, New York State Energy Research and Development Authority, EPA, DOE and Power Authority of the State of New York
(EPRI Proj. 1341-1)
(DE82-005591; EPRI-CS-2009-Vol-2; CS-2009-Vol-2) Avail: NTIS HC A20/MF A01

The objective of the coal-waste artificial reef program is to explore the technical feasibility and the environmental effects of a method for ocean disposal of fly ash and scribber sludge, combustion wastes from power plants. The program constructed a demonstration artificial reef in the Atlantic Ocean off Long Island from about 15,000 stabilized blocks of these coal waste materials. Techniques were developed for coal waste block fabrication utilizing machines and equipment from the concrete block industry. Accelerated steam curing procedures developed block strengths adequate for industrial handling and stacking. A series of laboratory studies determined the physical and chemical properties and leachate characteristics of a variety of coal waste blocks and their interactions in seawater systems. In laboratory bioassays and in field tests, the material did not appear to be toxic in the sea. These results all suggested that the blocks are compatible with the marine environment. DOE

N83-16955# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.

IDENTIFICATION AND REMOVAL OF THE ORGANIC COMPOUNDS IN COAL-CONVERSION CONDENSATE WATERS

Donald H. Mohr, Jr. and C. Judson King Nov. 1981 10 p refs Presented at the Wastewater Workshop, Germantown, Md., 24-25 Jun. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE82-004825; LBL-13584; CONF-8106109-3) Avail: NTIS HC A02/MF A01

Solvent extraction studies show that a large fraction of the chemical oxygen demand (COD) can be economically removed with solvent extraction and steam stripping. The fraction of the COD which remains is significant and is composed of very polar compounds. A high-performance liquid chromatography technique was developed which provides qualitative and quantitative information about these compounds, as well as phenolics. This technique uses an evaporative solvent change from water to isopropanol, which allows identification by gas chromatography and mass spectroscopy. Dimethyl hydantoin and related compounds were

identified in a coal gasification condensate water for the first time. However, the levels of these compounds appear to be affected by sample age and storage conditions. DOE

N83-16956# California Univ., Livermore. Lawrence Livermore Lab.

CHEMICAL CHARACTERIZATION OF ORGANIC CONTAMINANTS IN GROUNDWATER NEAR AN UNDERGROUND COAL GASIFICATION SITE

Daniel H. Stuermer, Douglas J. Ng, and Clarence J. Morris Nov. 1981 23 p refs Presented at the DOE Workshop on Chem. Characterization of Hazardous Substances in Synfuels, Seattle, 4-6 Nov. 1981

(Contract W-7405-eng-48)

(DE82-004822; UCRL-86983; CONF-811160-1) Avail: NTIS HC A02/MF A01

Groundwater samples collected near three underground coal gasification (UCG) sites in the Powder River Basin near Gillette, Wyoming were analyzed for dissolved organic contaminants. The contaminants consisted of a rather simple mixture of phenols, aromatic hydrocarbons, pyridines, quinolines, and isoquinolines. The same groupings of contaminants were observed in samples from different sites and different aquifers although the relative concentrations of compounds varied widely. Apparently, partitioning of the deposited by-product tars between the water and the aquifer substrate results in this similarity of composition. Naphthalene, oxylene, 2-methylpyridine, and o-cresol were consistently present at relatively high concentrations in contaminated samples and could, therefore, be used as indicators of UCG contaminants. A simplified method of analysis was developed to monitor for these indicator compounds in groundwater that employed liquid-liquid extraction at pH 8.2 followed by gas chromatography and, when required, gas chromatography-mass spectrometry analysis. DOE

N83-16957# Brookhaven National Lab., Upton, N. Y. Land and Freshwater Environmental Sciences Group.

ECOLOGICAL EFFECTS OF ACID PRECIPITATION ON PRIMARY PRODUCERS

H. Lee Conway and George R. Hendrey 1981 22 p refs Presented at the Conf. on the Effects of Acid Precipitation on Ecological Systems in the Great Lakes Region of the United States, East Lansing, Mich., 1-3 Apr. 1981

(Contract DE-AC02-76CH-00016)

(DE82-004795; BNL-30395; CONF-810464-2) Avail: NTIS HC A02/MF A01

The effects of acid rain upon the plant species composition of lakes are discussed. Non-acidic, oligotrophic lakes are typically dominated by golden-brown algae, diatoms and green algae. With increasing acidity, the number of species decrease and the species composition changes to dinoflagellates and golden-brown algae, with blue-green algae dominating in some cases. For macrophytic plants, dense stands of Sphagnum and Utricularia are found in some acidic lakes which may reduce nutrient availability and benthic regeneration. Hydrogen ion concentration does not appear to be as important as inorganic phosphorus in controlling primary production and biomass in acidic lakes. In acidic, oligotrophic lakes, benthic plants may have a competitive advantage over pelagic algae because of the high concentrations of inorganic carbon and phosphorus available to them in the sediment. DOE

N83-16958# Brookhaven National Lab., Upton, N. Y.

OXIDANT AIR POLLUTION: ESTIMATING ECONOMIC EFFECTS ON US VEGETATION

Paul D. Moskowitz, Elizabeth A. Coveney, William H. Medeiros, and Samuel C. Morris 1981 16 p refs Presented at the 74th Ann. Meeting of the Air Pollution Control Assoc., Philadelphia, 21-26 Jun. 1981

(Contract DE-AC02-76CH-00016)

(DE82-002858; BNL-30219; CONF-810631-5) Avail: NTIS HC A02/MF A01

Although air pollutant effects on crops were recognized for over a century, the ability to produce accurate estimates of biological damage and to translate these estimates into dollar losses is currently surrounded by considerable uncertainty and controversy. Results of two different approaches for estimating some national-level economic effects of oxidants on a selected crop, alfalfa, are compared. The first uses a modified version of the Stanford Research Institute (SRI) plant impact model. The SRI model makes several simplifying assumptions that have not received wide scrutiny. Nevertheless, the models' results have had great influence on US perceptions about national-level effects of air pollutants on plants. The second approach, using a model called DAMAGE, combines data from other sources including an ozone dose-response damage function for alfalfa, EPA air quality measurements, and US Census of Agriculture crop yield statistics to produce more defensible estimates of biological damage. DOE

N83-16959# Oak Ridge National Lab., Tenn.

HEALTH AND SAFETY ISSUES OF ALTERNATE ENERGY SYSTEMS

Annetta P. Watson, Elizabeth L. Etnier, and Philip J. Walsh 1981 19 p refs Presented at the ANS Executive Conf. on Alternate Energy Sources for Elec. Power, Cape Code, Mass., 4 Oct. 1981

(Contract W-7405-eng-26)

(DE82-002918; CONF-8110117-1) Avail: NTIS HC A02/MF A01

An evaluation of potential occupational and public health aspects of geothermal, biomass, solar, and fossil energy technologies was performed. Identification of potentially hazardous processes of each fuel cycle was made, as well as development of quantitative evaluation when necessary data were available. Occupational exposure to hydrogen sulfide gas occurs near all geothermal sites. Principal health and safety considerations of biomass pathways are directly related to the diffuse nature of solar energy fixation by photosynthesis and subsequent transfer to animal food chains. Unique hazards associated with solar energy include occupational exposures to Cd and As during manufacture of photovoltaic cells. Potential occupational hazards during production of synfuels from coal and oil shale include accidents and disease resulting from ore removal; and dermal and inhalation exposures to carcinogens, tumorigens, and caustic agents. DOE

N83-16960# Oak Ridge National Lab., Tenn. Monitoring Technology and Instrumentation Group.

INEXPENSIVE PASSIVE FORMALDEHYDE MONITOR FOR INDOOR AIR-QUALITY MEASUREMENTS

A. R. Hawthorne and T. G. Matthews 1981 5 p Presented at the Intern. Symp. on Indoor Air Pollution, Health and Energy Conservation, Amherst, Mass., 13 Oct. 1981

(Contract W-7405-eng-26)

(DE82-002914; CONF-811048-2) Avail: NTIS HC A02/MF A01

A description is given of the development of an inexpensive, passive formaldehyde sampler as a complement to current pumped impinger sampling methodology to provide an integrated exposure measurement. The sampling device is a small container with a dimethylsilicone membrane opening through which the formaldehyde permeates. The sampler's pumping is maintained by providing a concentration sink on the collection side of the sampler. The collection medium is usually water, although 13X molecular sieve has also been used. DOE

N83-16961# California Univ., Berkeley. Lawrence Berkeley Lab. Biology and Medicine Div.

IS NUCLEAR ENERGY AN UNACCEPTABLE HAZARD TO HEALTH?

Jacob I. Fabrikant Nov. 1981 10 p Presented at the 109th Ann. Meeting of the Am. Public Health Assoc., Los Angeles, 1-5 Nov. 1981

(Contract W-7405-eng-48)

(DE82-004954; LBL-13586; CONF-811159-1) Avail: NTIS HC A02/MF A01

Five conclusions were drawn: (1) health evaluation of energy-generating sources for electricity must be limited, at the present time, to coal, oil, natural gas, and nuclear. Coal and nuclear power will be the principal fuels for electric power production in the next 25 years. Systematic utilization of alternative renewable energy sources for power production will not have yet been accomplished;

(2) comparison can be made of estimates of morbidity and mortality, and evaluation of long-term delayed health effects such as carcinogenesis and genetic effects; (3) at the present time, fossil fuels, primarily coal, have greater adverse impact on health than does nuclear power production; (4) nuclear power reactors emit low-level radiation under normal operating conditions. Federal regulations limit the radiation dose to levels which are only a small fraction of the annual average natural background radiation in the United States. Such low levels of radiation do not result in adverse health effects; and (5) efforts must be directed toward reducing any adverse health impacts of all forms of energy production. DOE

N83-16962# Brookhaven National Lab., Upton, N. Y. Atmospheric Sciences Div.

COMPILATION OF SOURCE EMISSIONS DATA AND THEIR USE IN AIR QUALITY MODELS

Carmen N. Berkowitz 1982 4 p refs Presented at the 3rd Joint Conf. on Appl. of Air Pollution Meteorol., San Antonio, 11-15 Jan. 1982

(Contract DE-AC02-76CH-00016)

(DE82-002225; BNL-30101; CONF-820101-5) Avail: NTIS HC A02/MF A01

The Multistate Atmospheric Power Production Pollution Study (MAP3S) is addressed to the physical understanding and the mathematical characterization of wet and dry deposition of atmospheric pollutants. One of the major problems encountered in correlating the data sets of source emissions is in the area of standardization. The use and refinement of emission factor data in an ongoing project. An overall summary of the current inventory data on NO/sub x/, SO/sub x/, CO, hydrocarbons, and particulates is presented. A breakdown of the point source emissions by industrial groupings is tabulated. To allow greater refinement in the treatment of area source data a proposed methodology to disaggregate these emissions to a subcounty level involves the use of the population figures and population centroids. Depending on the size of the area to be modeled, an appropriate level of demographic data aggregation can be chosen and population figures and population centroids calculated. DOE

N83-16963# Los Alamos Scientific Lab., N. Mex.

REGIONAL AIR QUALITY IN THE FOUR CORNERS STUDY REGION: MODELING APPROACH

David Nochumson 1982 6 p refs Presented at the 3rd Joint Conf. on Appl. of Air Pollution Meteorol., San Antonio, 11-15 Jan. 1982

(Contract W-7405-eng-36)

(DE81-030251; LA-UR-81-2484; CONF-820101-3) Avail: NTIS HC A02/MF A01

A two-dimensional Eulerian air pollutant transport model is discussed. The regional modeling methodology and some sample results from the regional air quality analysis are presented. One major advantage of the regional transport model that was employed is that its solution involves the calculation of transfer coefficients that relate emissions to ambient concentrations and deposition and which can be used repeatedly to evaluate alternative scenarios and regulatory policies which represent different emission source configurations. The regional transport model was used in the calculation of the concentration and deposition of SO2, SO4, and primary fine particulates; and these estimates were used as inputs to regional atmospheric visibility and mass budget calculations. DOE

N83-16964# California Univ., Berkeley. Lawrence Berkeley Lab.

RADON-DAUGHTER EXPOSURES IN ENERGY-EFFICIENT BUILDINGS

A. V. Nero, J. V. Berk, M. L. Boegel, C. D. Hollowell, J. G. Ingersoll, and W. W. Nazaroff Oct. 1981 10 p refs Presented at the Spec. Meeting on Assessment of Radon and Daughter Exposure and Related Biol. Effects, Rome, 3-7 Mar. 1980

(Contract W-7405-eng-48)

(DE82-003711; LBL-11052; CONF-800398-4) Avail: NTIS HC A02/MF A01

Measures that reduce energy use by reducing natural infiltration or mechanical ventilation in new or retrofit buildings are discussed. Measurements in buildings specifically designed to use energy efficiently or utilize solar heating were performed. In many of these buildings radon concentrations appear to arise primarily from soil underlying the buildings. Measures to control higher levels, e.g., by mechanical ventilation with heat recuperation, appear to be economical. However, to evaluate energy-saving programs adequately requires a much more comprehensive characterization of radon sources (for example, by geographical area) and a much fuller understanding of the dynamics of radon and its daughters indoors than now exist. Author

N83-16965# Cincinnati Univ., Ohio. Dept. of Biological Sciences.

BIOLOGICAL/ENVIRONMENTAL RELATIONSHIPS IN DESERT ECOSYSTEMS OF THE NEVADA TEST SITE Final Report, 1 Feb. 1973 - 31 Aug. 1980

Janice C. Beatley Nov. 1981 5 p

(Contract DE-AS02-76EV-02307)

(DE82-003652; DOE/EV-02307/17) Avail: NTIS HC A02/MF A01

The processing and bringing to publication form data collected on the Gen-12 contract 1960 to 1973 is discussed. Publications of the contract period February 1, 1973 to August 31, 1980 are listed, and status of the research and research records is recorded at this time of dissolution of the 20-year research association of the investigator with the Atomic Energy Commission and its agency successors. DOE

N83-16966# Manhattan Coll., New York. Lab. for Plant Morphogenesis.

GENERATION OF DOSE-RESPONSE RELATIONSHIPS TO ASSESS THE EFFECTS OF ACIDITY IN PRECIPITATION ON GROWTH AND PRODUCTIVITY OF VEGETATION

Lance S. Evans 1981 40 p refs Presented at the 2nd Ann. Meeting of the Soc. of Environ. Toxicol. and Chem., Arlington, Va., 22-24 Nov. 1981 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y.

(Contract DE-AC02-76CH-00016)

(DE82-006254; BNL-30369; CONF-811158-1) Avail: NTIS HC A03/MF A01

Experiments were performed with several plant species in natural environments as well as in a greenhouse and/or tissue culture facilities to establish dose-response functions of plant responses to simulated acidic rain in order to determine environmental risk assessments to ambient levels of acidic rain. Response functions of foliar injury, biomass of leaves and seed of soybean and pinto beans, root yields of radishes and garden beets, and reproduction of bracken fern are considered. The dose-response function of soybean seed yields with the hydrogen ion concentration of simulated acidic rainfalls was expressed by the equation $y = 21.06 - 1.01 \log x$ where y = seed yield in grams per plant and x = the hydrogen concentration. The correlation coefficient of this relationship was -0.90. A similar dose-response function was generated for percent fertilization of ferns in a forest understory. Other dose-response functions were generated that assist in a general knowledge as to which plant species and which physiological processes are most impacted by acidic precipitation. DOE

N83-16967# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.

ROLE OF SOOT IN AEROSOL CHEMISTRY

T. Novakov Dec. 1981 6 p refs Presented at 20th Aerospace Sci. Conf., Orlando, Fla., 11-14 Jan. 1982

(DE82-007606; LBL-12938; CONF-820106-5) Avail: NTIS HC A02/MF A01

The role of soot in aerosol chemistry was assessed. A methodology was developed to determine empirically the soot concentrations in various regions of the United States. The mechanism and kinetics of SO2 oxidation, are used to establish the relative importance of soot catalyzed SO2 oxidation in the

atmosphere. The methods used for determining soot concentrations and the experimental results on SO2 oxidation are reviewed. GRA

N83-16968# Kansas State Univ., Manhattan.
ELECTRICAL ASPECTS OF RAINOUT Final Report
C. E. Rosenkilde Livermore, Calif. California Univ. Lawrence Livermore Lab. 23 Nov. 1981 107 p refs
(Contract W-7405-eng-48)
(DE82-006780; UCRL-15417) Avail: NTIS HC A06/MF A01

The influence of a radioactive environment on the electrical aspects of rainout is discussed. Nuclear debris aerosols are scavenged within natural clouds by a variety of different physical processes which involve diffusion, convection, impaction, nucleation, phoresis, turbulence, and/or electricity among others. Processes which involve electrical aspects are scrutinized for their susceptibility to the intimate presence of the radioactive cloud environment. This particular choice of electrical processes is not accidental. It is suggested that electrical effects, and to a lesser extent turbulence, could enhance the scavening of those submicron aerosols which reside in the size range that bridges the minimum in the scavening rate coefficient. This minimum in the scavenging rate coefficient is created by the simultaneous reduction of scavenging via diffusion and the reduction of scavenging via inertial impaction. DOE

N83-16969# Oak Ridge National Lab., Tenn. Environmental Sciences Div.
ECOSYSTEM RISK ANALYSIS
R. V. ONeill, R. H. Gardner, L. W. Barnthouse, G. W. Suter, L. W. Hildebrand, and C. W. Gehrs 1981 32 p refs Presented at Ann. Meeting of Soc. of Environ. Toxicology, Washington, D.C., 30 Sep. 1981 Sponsored in part by Environmental Protection Agency
(Contract W-7405-eng-26; Grant NSF DEB-77-25781)
(DE82-002848; CONF-8109103-1) Avail: NTIS HC A03/MF A01

A method for extrapolating laboratory toxicity data to aquatic ecosystem effects such as decreased productivity or reduction in game fish biomass is presented. The extrapolation requires translating laboratory data into changes in the parameters of an ecosystem model, the Standard Water Column Model (SWACOM). The scenarios in which effects of toxic substances are distributed across different trophic levels are presented. Each scenario affects population interactions in different ways and alters both the level and the nature of the risks to ecosystem processes. The interaction between toxicity and the uncertainties associated with extrapolation is analyzed. DOE

N83-16970# Ames Lab., Iowa.
RECENT DEVELOPMENTS IN THE LIME-FLY ASH PROCESS FOR ALUMINA AND CEMENT
M. J. Murtha and G. Burnet 1981 15 p refs Presented at the Symp. on Resource Recovery and Environ. Issues of Ind. Solid Wastes, Gatlinburg, Tenn., 28-30 Oct. 1981 Prepared in cooperation with Iowa State Univ., Ames
(Contract W-7405-ENG-82)
(DE82-006259; IS-M-356; CONF-8110137-1) Avail: NTIS HC A02/MF A01

Recent developments from research of the limestone-fly ash sinter process for the extraction of alumina from coal fly ash and use of the residue in the manufacture of portland cement may result in substantial reductions in processing costs. It was found that cement kiln dust can be used in place of limestone, and that the addition of coal refuse to the sinter mixture will increase alumina recovery and reduce kiln temperatures required. Compound formation conditions were determined for a range of sinter compositions. A systematic investigation of minor additives to sinter compositions resulted in the determination of a group of ions which, when present in sintered material, will prevent the autodisintegration (dusting) of the clinker formed. Use in the process of other wastes provides further incentive for coal ash processing to meet our nation's requirements for alumina and cement. DOE

N83-16971# Los Alamos Scientific Lab., N. Mex.
PENETRATION AND AIR-EMISSION-REDUCTION BENEFITS OF SOLAR TECHNOLOGIES IN THE ELECTRIC UTILITIES
Ronald J. Sutherland 1981 12 p refs Presented at the 4th Intern. Conf. on Alternative Energy Sources, Miami Beach, Fla., 14 Dec. 1981
(Contract W-7405-eng-36)
(DE82-002637; LA-UR-81-3252; CONF-811212-1) Avail: NTIS HC A02/MF A01

The results of a study of four solar energy technologies and the electric utility industry are reported. The purpose was to estimate the penetration by federal region of four solar technologies: wind, biomass, photovoltaics, and solar thermal, in terms of installed capacity and power generated. The penetration by these technologies occurs at the expense of coal and nuclear power. The displacement of coal plants implies a displacement of their air emissions. The main conclusion is that solar thermal, photovoltaics, and biomass fail to penetrate significantly by the end of this century in any federal region. Wind energy penetrates the electric utility industry in several regions during the 1990s. A moderate displacement of sulfur dioxide and the oxides of nitrogen is estimated to occur by the end of this century, and significant lowering of these emissions should occur in the early part of the next century. DOE

N83-16972# Oak Ridge National Lab., Tenn. Energy Div.
THE IMPLICATIONS OF A STOCHASTIC APPROACH TO AIR-QUALITY REGULATIONS
A. J. Witten, F. C. Kornegay, D. B. Hunsaker, Jr., E. C. Long, Jr., R. D. Sharp, P. J. Walsh, E. A. Zeighami, J. S. Gordon (Engineering Societies Commission on Energy), and W. L. Lin (ERAS, Inc.) Sep. 1982 114 p refs
(Contract W-7405-eng-26)
(DE83-001636; ORNL/TM-8440) Avail: NTIS HC A06/MF A01

The viability of a stochastic approach to air quality regulation is discussed. The stochastic approach considered is one which incorporates the variability which exists in sulfur dioxide (SO2) emissions from coal-fired power plants. Emission variability arises from a combination of many factors including variability in the composition of as-received coal such as sulfur content, moisture content, ash content, and heating value, as well as variability watch is introduced in power plant operations. The stochastic approach as conceived addresses variability by taking the SO2 emission rate to be a random variable with specified statistics. Given the statistical description of the emission rate and known meteorological conditions, it is possible to predict the probability of a facility exceeding a specified emission limit or violating an established air quality standard. The implications of accounting for emissions variability by allowing compliance to be interpreted as an allowable probability of occurrence of given events is also discussed. Health benefits and economic factors are discussed. DOE

N83-16973# Pacific Northwest Lab., Richland, Wash.
GUIDELINES FOR SAMPLING AND ANALYZING SOLUTIONS FOR AQUIFER THERMAL-ENERGY-STORAGE SYSTEMS
W. J. Deutsch Sep. 1982 15 p refs
(Contract DE-AC06-76RL-01830)
(DE83-001852; PNL-4355) Avail: NTIS HC A02/MF A01

The successful aquifer storage and retrieval of energy in the form of heated or chilled water require that the engineered system be compatible with the natural ground water system. The composition of the ground water must be well known to predict and avoid potential problems that heating or cooling the water may create for operation of the plant. A set of guidelines for sampling and analyzing solutions from simulated or real groundwater energy storage systems is given. Sampling guidelines include methods for flushing wells of stagnant water and monitoring selective solution parameters (pH, Eh, temperature or conductivity) as indicators of the efficiency of flushing. Certain unstable groundwater parameters (temperature, pH, Eh, dissolved oxygen, and conductivity) should be measured onsite. It is recommended that alkalinity, sulfide, and ammonia determinations be done within 24 hr of sampling. Samples of the ground water should be filtered,

preserved, and stored for laboratory analysis of major cations, anions, trace metals, organic and inorganic carbon and certain redox couples (Fe(2) Fe(3)) and (As(3) As(5)). DOE

N83-16974# Decision Focus, Inc., Palo Alto, Calif.
ACID DEPOSITION: DECISION FRAMEWORK. VOLUME 1: DESCRIPTION OF CONCEPTUAL FRAMEWORK AND DECISION-TREE MODELS Final Report
W. E. Balson, D. W. Boyd, and D. W. North Aug. 1982 114 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 2156)
(DE82-906592; EPRI-EA-2540-Vol-1) Avail: NTIS HC A06/MF A01

This report presents a framework for the analysis of decisions on acid deposition. The decision framework is intended as a means of summarizing scientific information and uncertainties on the relation between emissions from electric utilities and other sources, acid deposition, and impacts on ecological systems. The methodology for implementing the framework is that of decision analysis, which provides a quantitative means of analyzing decisions under uncertainty. The decisions of interest include reductions in sulfur oxide and other emissions thought to be precursors of acid deposition, mitigation of acid deposition impacts through means such as liming of waterways and soils, and choice of strategies for research. The report first gives an overview of the decision framework and explains the decision analysis methods with a simplified caricature example. The state of scientific information and modeling assumptions for the framework are then discussed for the three main modules of the framework; emissions and control technologies; long range transport and chemical conversion in the atmosphere; and ecological impacts. DOE

N83-16975# Tennessee Valley Authority, Muscle Shoals, Ala.
PROGRAMMATIC ENVIRONMENTAL OVERVIEW. BIOMASS FUELS PROGRAM
J. C. Boetheli, R. P. Beson, C. E. Bohac, R. H. Ginn, P. M. Giordano, S. W. Jamison, J. E. Jordan, J. M. Loney, D. M. McCarthy, W. H. Ogden et al Jul. 1982 24 p refs
(DE82-906065; TVA/OACD-82/16) Avail: NTIS HC A02/MF A01

Some potential environmental issues related to use of renewable biomass resources as fuels are identified. Possible management strategies for eliminating or holding the consequences within manageable bounds are suggested. Production impacts are discussed as follows: soil erosion, water quality, soil/stand productivity, and aesthetics, wildlife, and related areas. Conversion and combustion impacts on air quality, water quality, and solid wastes are described. DOE

N83-16976# Argonne National Lab., Ill. Chemical Engineering Div.
ALKALI-METAL-VAPOR REMOVAL FROM PRESSURIZED FLUIDIZED-BED COMBUSTOR FLUE GAS Annual Report, Oct. 1980 - Sep. 1981
Irving Johnson and S. H. D. Lee Jan. 1982 38 p refs
(Contract W-31-109-eng-38)
(DE82-008088; ANL/FE-81-59) Avail: NTIS HC A03/MF A01

Methods for the cleanup of high-temperature, high-pressure combustion gases from pressurized fluidized-bed coal combustors so that the cleaned gases can be used to power downstream gas turbines are discussed. Data are presented on the use of activated bauxite in a granular bed filter for the removal of gaseous NaCl from hot (800 C), pressurized (approximately less than 8 atm), wet simulated flue gas. Also, the sorption mechanisms are discussed. Greater than 99.9% NaCl vapor capture was achieved. Also reported are the effects of several operating variables on the rate of leaching of NaCl that was adsorbed on activated bauxite and the volatility of alkali metal compounds present as impurities in activated bauxite. Finally, the preliminary estimate of the cost of using activated bauxite for the control of alkali vapors from flue gas was updated; a conceptual design of a fixed granular-bed filter was presented; and the energy needs and their costs for operating the filter in the once-through and the sorbent-regeneration modes were compared. DOE

N83-16977# Oak Ridge National Lab., Tenn. Environmental Sciences Div.
ENVIRONMETRICS OF SYNFUELS. PART 4: PROJECT RESULTS TRACKING SYSTEM (PRTS)
R. H. Strand, M. P. Farrell, K. L. Daniels, and J. C. Goyert 1982 93 p refs Presented at the SAS Users Group Intern. Meeting, San Francisco, 14 Feb. 1982
(Contract W-7405-eng-26)
(DE82-011444; CONF-820219-2) Avail: NTIS HC A05/MF A01

An assessment of the environmental and health effects of a low-Btu coal gasification facility are discussed. The sampling program generated over 2.5 million records characterizing, documenting, and estimating various environmental and process-related parameters. A Project Results Tracking System (PRTS) was designed and implemented to account for and summarize the status of all samples taken during the project. The results of the computerization effort are given. The PRTS operates on a request record providing information on the samples and what analyses are needed and processes a result record containing analytical results corresponding to those requested for the sample. The results as they are reported are merged with the request records to complete the requested transactions. A library of routines for generating exception reports and status reports was created. A formatted code library with over 500 codes was implemented. DOE

N83-16978# Swedish Water and Air Pollution Research Lab., Goeteborg.
EMISSIONS OF HYDROCARBONS AND NITROGEN OXIDES IN THE GOETBORG AREA 1979
Peringe Grennfelt and Gun Loevblad Feb. 1981 14 p refs
(DE82-901367; IVL-B-598) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

An inventory of nitrogen oxides and hydrocarbon emissions was made for the Goeteborg area in 1979. To some extent emissions from specific sources were known. In all other cases emissions were estimated from data on solvent use, petrol use, and emission factors. The results show a yearly nitrogen oxide emission of approximately 22,000 tons (as NO2) and a yearly hydrocarbon emission of approximately 37,000 tons. Further, the diurnal variation of emissions was estimated for a summer and a winter week-day. The variation pattern shows clearly the high contribution from the traffic. DOE

N83-16979# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
SIMULATION OF AIR-POLLUTION PROPAGATION RESULTING FROM AT-SEA INCINERATION WASTES
D. Eppel, J. Haeuser, H. T. Mengelkamp, and A. Mueller 1981 11 p refs Presented at the 5th Intern. Clean Air Congr., Buenos Aires, 20-26 Oct. 1980
(DE82-902297; GKSS-30/E/57) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

The model MODIS is used for simulating the transport of the hydrogen chloride plume stemming from the at sea incineration of chemical wastes. The construction of the wind field by a simple meteorological model is described, and wash out and absorption parameters used are given. DOE

N83-16980# Research Inst. of National Defence, Linkoeping (Sweden).
ACQUISITION OF ENVIRONMENTAL DATA OF THE HYDROSPHERE
Soeren Palmgren Jul. 1982 57 p refs In ENGLISH; SWEDISH summary
(FOA-C-30284-E) Avail: NTIS HC A04/MF A01

Development and tests of methods for acquisition of environmental data, including active remote sensing and in situ methods are reviewed. Remote sensing of sea ice with IR thermography; lidar techniques; laser induced fluorescence from algae; laser

bathymetry; optical properties of sea water; and smoke plume measurements are discussed. Author (ESA)

N83-16981# Washington State Univ., Pullman. Coll. of Engineering.

ANALYTICAL METHODOLOGY FOR THE IDENTIFICATION AND QUANTIFICATION OF VAPOR PHASE ORGANIC POLLUTANTS Final Report

H. H. Westberg, M. W. Holdren, and H. H. Hill, Jr. Jan. 1982 132 p refs Sponsored by Coordinating Research Council, Inc. (PB82-255753; CRC/APRAC/CAPA-11-71; Rept-82-13-5) Avail: NTIS HC A07/MF A01 CSCL 07D

A variety of collection, storage, and determination procedures for vapor phase organics in the atmosphere are described. Results of laboratory and field studies with these experimental sampling systems are presented along with recommendations for field sampling procedures. Sampling with porous polymer absorbents and with stainless steel canisters were found to be complimentary methods with absorbent techniques being preferred for the determination of specific organic compounds with carbon numbers greater than 8 while canister collection methods are preferred for low molecular weight compounds, or when a variety of unknown atmospheric components need identification. Author (GRA)

N83-16982# Battelle Columbus Labs., Ohio.

DIESEL ENGINE EMISSIONS OF PARTICULATES AND ASSOCIATED ORGANIC MATTER Annual Report

Bruce A. Petersen, Thomas A. Bishop, Cheng C. Chuang, Glenn W. Kinzer, and Timothy L. Hayes 18 Jun. 1982 184 p (PB82-255928; CRC-APRAC-CAPE-24-72; AR-2) Avail: NTIS HC A09/MF A01 CSCL 07D

The development and validation of a method for the collection and measurement of the true diesel engine polynuclear aromatic hydrocarbon (PNA) emission is discussed. Quantification of recovery from particulate; system refinement in exhaust gas and dilution air mixing; development of a satisfactory tracer injection system; evaluation of day-to-day repeatability of the overall engine, sampling, and analytical procedures are discussed. An evaluation of the influence of several dilution system variables on PNA measurements is given. GRA

N83-16983# Bureau of Mines, Pittsburgh, Pa.

DETERMINATION OF SULFATES IN DIESEL EXHAUST. REPORT OF INVESTIGATIONS, 1982

Robert W. Freedman and Frederick A. Sharp Jun. 1982 12 p refs

(PB82-257171; BM-RI-8683) Avail: NTIS HC A02/MF A01 CSCL 07D

Sampling and analytical procedures used for measurement of sulfates in diesel tailpipes and in the diluted exhaust within dilution tunnels are discussed. A variety of methods exist for sulfate analysis for such systems, including ion exchange. Two chemical methods are described in detail. These are based upon spectrophotometric measurement f chloranillic acid using barium chloranilate. The procedures are rapid and relatively inexpensive. In general, ion exchange is preferred by many analysis for sulfate analysis. However, it is more complex and expensive than chloranillic acid procedures, which are adequate for exhaust analysis. Author (GRA)

N83-16984# Systems Applications, Inc., San Rafael, Calif.

A NEW CARBON-BOND MECHANISM FOR AIR QUALITY SIMULATION MODELING Interim Report, Jun. 1980 - Jun. 1981

J. P. Killus and G. Z. Whitten Apr. 1982 117 p refs

(Contract EPA-68-02-3281)

(PB82-258997; EPA-600/3-82-041) Avail: NTIS HC A06/MF A01 CSCL 07D

A new generalized kinetic mechanism for photochemical smog, which incorporates recent information on the atmospheric reactions of aromatic hydrocarbons, was developed. The mechanism, labeled the Carbon-Bond Mechanism III (CBM III), is the third lumped-parameter mechanism to be designed in accordance with the carbon-bond reaction concept in which carbon atoms with similar bonding are treated similarly, regardless of the molecules in which they occur. Because of the general nature of the CBM III, it can be used to model the entire atmospheric mix of hydrocarbons and is suitable for use in air quality simulation models. Principal features of CBM III include a separate reaction scheme for ethylene and realistic photochemistry for aromatic hydrocarbons and dicarbonyl compounds. Author (GRA)

N83-16985# National Oceanic and Atmospheric Administration, Boulder, Colo. Office of Marine Pollution Assessment.

EFFECTS OF PETROLEUM ON SELECTED UNIFORM SUBSTRATES: A FEASIBILITY STUDY

Amy Schoener and Foppe B. DeWalle Jun. 1982 55 p refs

(PB82-255084; NOAA-TM-OMPA-18; NOAA-82072101) Avail: NTIS HC A04/MF A01 CSCL 08A

By oiling an early colonizing species of replicate substrates the effects of a one-time oiling event on an initial hard substrate colonizer, the encrusting bryozoan Parasmittina trispinosa, was simulated. Subsequent community development was then monitored over a period of several months. Experimental manipulations were conducted in the laboratory on panels which prior to and manipulation events were positioned in the natural environment. Panels whose bryozoan colonies were removed but received no subsequent oiling of the vacant spot had a higher percent of cover 10 days after manipulations then those panels receiving oil after the bryozoan removals. These panels also eventually achieved the highest total percent coverage. GRA

N83-16986# Washington State Univ., Pullman. Air Resources Section.

DETERMINATION OF DRY DEPOSITION RATES FOR OZONE Final Report, 1977 - 1979

Elmer Robinson, Brian Lamb, and M. P. Chockalingam Apr. 1982 84 p refs

(Grant EPA-R-805342)

(PB82-258989; EPA/600/3-82-042) Avail: NTIS HC A05/MF A01 CSCL 13B

Ozone (03) velocity deposition (V(d)) measurements over three different vegetation types at three different geographic locations in the United States are discussed. V(d) measurements of ozone were related to more commonly measured meteorological parameters over a wide range of ambient conditins. In this way a general calculation procedure could be developed for ozone V(d) to be used in pollutant transport models. GRA

N83-16987# Oklahoma Univ., Norman. Bureau of Water and Environmental Reources Research.

APPROPRIATE SELECTION OF WATER/WASTEWATER TREATMENT PROCESSES FOR SMALL CITIES AND RURAL AREAS Technical Completion Report

George W. Reid, Andy Law, and Tanwir Chaudhry Mar. 1982 87 p refs Sponsored by the Oklahoma Water Resources Research Inst.

(Contract DI-14-34-0001-1138)

(PB82-254889; OWRT-A-100-OKLA(A); W82-06162) Avail: NTIS HC A05/MF A01 CSCL 13B

A computer application model is presented that will aid engineers and planners in determining a community's needs and resources. Two versions of this model were developed: one, for use on a low-cost microcomputer; the other, for use with a hand-held calculator. Both of these versions consider the socio-technological level of the community, as well as indigenous information covering water quality and demographic data. Four communities in the rural and urban fringe in Oklahoma were selected for testing the validity of this model. The model identifies water and waste treatment alternatives which are compatible with local available resources and manpower capabilities; application of appropriate technology substantially enhances the ability of the community to satisfy its water and wastewater treatment objectives. Community information was obtained from the use of two survey

questionnaires to assist identification of appropriate technology for water/wastewater treatment. GRA

N83-16988# Coordinating Research Council, Inc., Atlanta, Ga.
INFORMATIONAL REPORT ON THE MEASUREMENT OF DIESEL PARTICULATE EMISSIONS
G. P. Gross, J. S. MacDonald, and S. M. Shahed Jun. 1982 145 p refs
(PB82-256249; CRC-522) Avail: NTIS HC A07/MF A01 CSCL 13B

Diesel particulate is a complex mixture of many components, including carbonaceous solid particles, several thousand hydrocarbon species adsorbed/condensed on particles, sulfate, metal oxides, and wear material. The measurement of total particulate mass of diesel engine particulate emissions is discussed. A collection of available information on particulate measurement methods is given. In each case, a specification of the measurement hardware, a description of the procedure to be followed, and a recommendation for laboratory practice are given. Wherever possible, the method is evaluated for accuracy, repeatability, and ease of operation. Different collection methods are described for different applications. Where sufficient data are not available and areas of work can be identified, recommendations for further work are made. Author (GRA)

N83-16989# Environmental Protection Agency, Research Triangle Park, N.C. Environmental Criteria and Assessment Office.
A REVIEW OF AIR POLLUTANT DAMAGE TO MATERIALS
John E. Yocom, Alexander R. Stankunas, and F. Vandiver Bradow Jun. 1982 103 p refs Prepared in cooperation with TRC Environmental Consultants, Inc.
(PB82-242090; EPA-600/8-82-016) Avail: NTIS HC A06/MF A01 CSCL 13B

Physical and economic effects of sulfur oxides, particulate matter, nitrogen oxide, ozone, hydrogen sulfides, fluoride, and ammonia on metals, textiles, paint, building materials, leather, paper and elastomers are discussed. Air quality criteria are discussed. GRA

N83-16990# SRI International Corp., Menlo Park, Calif. Atmospheric Sciences Center.
TRACE CHEMICAL IN THE CLEAN TROPOSPHERE Interim Report, 1979 - 1980
H. B. Singh, L. J. Salas, and R. Stiles Oct. 1981 57 p refs
(Grant EPA-R-806729)
(PB82-249202; EPA-600/3-81-055) Avail: NTIS HC A04/MF A01 CSCL 13B

Atmospheric measurements at Point Arena, California (39 N) are used to assess the burden as well as the growth rates of a large number of important atmospheric trace chemicals. In early 1981 the organic fluorine, chlorine, bromine, and iodine burden of the northern hemisphere (midlatitudes) was determined to be 1.3 parts per billion (ppb), 3.7 ppb, 0.02 ppb, and less than 0.003 ppb respectively. An increase of approximately 25 percent in the atmospheric burden of fluorine and chlorine appears to have occurred over the last three years. The dominant natural halocarbon, methyl chloride, does not appear to show any detectable trends. Among the important man-made chemicals such as methylene chloride, 1,2 dichloroethane, tetrachloroethylene, and trichloroethylene, slightly declining trends or change is evident. Author (GRA)

N83-16991# Coates (Joseph F.), Inc., Washington, D.C.
ENVIRONMENTAL CONSEQUENCES OF TELEMATICS: TELECOMMUNICATION, COMPUTATION, AND INFORMATION TECHNOLOGIES Progress Report, 11 Dec. 1980 - 15 Sep. 1981
Andrea Burgard Coolidge, Joseph F. Coates, Henry H. Hitchcock, and Teresa Gorman Apr. 1982 193 p refs
(Contract EPA-68-02-3667)
(PB82-249913; EPA-600/8-82-018) Avail: NTIS HC A09/MF A01 CSCL 13B

Current important research needs whose results will be critical to Environmental Protection Agency's mission in the next two to three decades with regard to a major expansion in the use of telematics, i.e., telecommunications, computer, and information technology, are identified. The potential enefits of telematics to the economy, the environment, and to health and safety are very large and numerous. Benefits will far outweight the potential social costs. The adverse impacts of microwave radiation, ozone, solid waste disposal, and physiological and psychological stress are discussed. Author (GRA)

N83-17365*# Jackson State Univ., Miss. Dept. of General Science.
A PRELIMINARY STUDY OF ENVIRONMENTAL PARAMETERS ASSOCIATED WITH THE FEASIBILITY OF A POLYGENERATION PLANT AT KENNEDY SPACE CENTER
Grover D. Barnes *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 18 p ref (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 13B

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N83-16992*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OZONE CLIMATOLOGY SERIES. VOLUME 1: ATLAS OF TOTAL OZONE, APRIL 1970 - DECEMBER 1976
D. F. Heath, A. J. Fleig, A. J. Miller, T. G. Rogers, R. M. Nagatani, H. D. Bowman, II, V. G. Kaveeshwar, K. F. Klenk, P. K. Bhartia, and K. D. Lee Dec. 1982 180 p refs Prepared in cooperation with National Oceanic and Atmospheric Administration, Washington D. C. and Systems and Applied Sciences Corp., Riverdale, MD.
(NASA-RP-1098; NAS 1.61:1098; Rept-82F0128-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 04A

Contours and gridded values are given for seven years of monthly mean total ozone data derived from observations with the Backscattered Ultraviolet instrument on Nimbus-4 for the Northern and Southern Hemispheres. The instrument, algorithm, uncertainties in derived ozone and systematic changes in the bias with respect to the international groundbased ozone network of Dobson instruments, are discussed. Author

N83-16993*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A STUDY OF THE UNITED STATES COAL RESOURCES
John C. Ferm and Paul J. Muthig 15 Sep. 1982 121 p refs Sponsored by NASA and DOE
(NASA-CR-169792; JPL-Pub-82-14; NAS 1.26:169792; DOE/ET-12548/15) Avail: NTIS HC A06/MF A01 CSCL 08G

Geologically significant coal resources were identified. Statistically controlled tonnage estimates for each resource type were prepared. Particular emphasis was placed on the identification and description of coals in terms of seam thickness, inclination, depth of cover, discontinuities caused by faulting and igneous intrusion, and occurrence as isolated or multiseam deposits. The national resource was organized into six major coal provinces: the Appalachian Plateau, the Interior Basins, the Gulf Coastal Plain, the Rocky Mountain Basins, the High Plains, and North Alaska. Each basin within a province was blocked into subareas of homogeneous coal thickness. Total coal tonnage for a subarea was estimated from an analysis of the cumulative coal thickness derived from borehole or surface section records and subsequently categorized in terms of seam thickness, dip, overburden, multiseam proportions, coal quality, and tonnage impacted by severe faulting and igneous intrusions. Confidence intervals were calculated for both subarea and basin tonnage estimates. Author

N83-16994*# Business and Technological Systems, Inc., Seabrook, Md.

MODELING THE THERMAL STRUCTURE AND MAGNETIC PROPERTIES OF THE CRUST OF ACTIVE REGIONS WITH APPLICATION TO THE RIO GRANDE RIFT Final Report
[1982] 33 p refs
(Contract NAS5-26616)
(NASA-CR-170467; NAS 1.26:170467; BTS33-82-88/rb) Avail: NTIS HC A03/MF A01 CSCL 08G

Experiments in Curie depth estimation from long wavelength magnetic anomalies are summarized. The heart of the work is equivalent-layer-type magnetization models derived by inversion of high-elevation, long wavelength magnetic anomaly data. The methodology is described in detail in the above references. A magnetization distribution in a thin equivalent layer at the Earth's surface having maximum detail while retaining physical significance, and giving rise to a synthetic anomaly field which makes a best fit to the observed field in a least squares sense is discussed. The apparent magnetization contrast in the equivalent layer is approximated using an array of dipoles distributed in equal area at the Earth's surface. The dipoles are pointed in the direction of the main magnetic field, which carries the implicit assumption that crustal magnetization is dominantly induced or viscous. The determination of the closest possible dipole spacing giving a stable inversion to a solution having physical significance is accomplished by plotting the standard deviation of the solution parameters against their spatial separation for a series of solutions. Author

N83-16995*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
PROPERTIES OF AKR FROM AN INTERFEROMETER ANALYSIS OF THE ISEE-1 AND -2 PLASMA WAVE DATA Final Science Report, Oct. 1980 - Dec. 1981
Mark M. Baumback and Stanley D. Shawan 11 Oct. 1982 11 p refs
(Grant NAG5-118)
(NASA-CR-170478; NAS 1.26:170478) Avail: NTIS HC A02/MF A01 CSCL 04A

Both ISEE 1 and 2 are equipped with identical wide-band analog plasma wave receivers which makes long baseline interferometry possible. A cross-correlation of the received signals from each spacecraft during periods of intense Auroral Kilometric Radiation (AKR) provides information on the source size of AKR. From the magnitude of the cross-correlation coefficient, measured over baselines from 40 Km to 8000 Km, an upper limit to the statistical source size can be determined. Thirty-five AKR events at 125 kHz are being analyzed. Preliminary results indicate that the apparent source sizes are smaller than .1 Re. Author

N83-16996*# National Air and Space Museum, Washington, D. C.
DESERT LANDFORMS OF SOUTHWEST EGYPT: A BASIS FOR COMPARISON WITH MARS Final Report
Farouk El-Baz, ed. and Ted A. Maxwell, ed. Washington NASA 1982 374 p refs
(Grant NsG-7486)
(NASA-CR-3611; NAS 1.26:3611) Avail: NTIS HC A16/MF A01 CSCL 08G

Geologic interpretations of The Gilf Kebir-Uweinat of Apollo-Soyuz photographs were verified. The photographs and LANDSAT images showed features reminiscent of those depicted by Mariner and Viking missions to Mars. These features were to better understand their morphologic analogs on Mars. It is indicated that climate change played a significant role in the formation of the eastern Sahara. It is also revealed that correlations between the eolian features in southwestern Egypt and the wind blown paterns on the surface of Mars result in a better understanding of eolian activity on both planets. E.A.K.

N83-16997# Massachusetts Univ., Amherst. Astronomy Research Facility.
INFRARED ATMOSPHERIC EMISSION, 1 Scientific Report, 1 Oct. 1980 - 28 Feb. 1982
Hajime Sakai Hanscom AFB, Mass. AFGL Mar. 1982 51 p refs
(Contracts F19628-81-K-0007; DAAG29-81-K-0179; AF Proj. 2310)
(AD-A120387; UMASS-ARF-82-322; SR-1; AFGL-TR-82-0085) Avail: NTIS HC A04/MF A01 CSCL 07/4

Energy levels and relative strengths for the 4f-5g transition in N i are calculated in the j-l coupling scheme. Excellent agreement is found with our interferometric data from sigma = 2455 to 2505/cm in both positions and intensities. Author (GRA)

N83-16998# Teledyne Geotechnical, Alexandria, Va. Seismic Data Analysis Center.
A STUDY OF SEISMIC WAVE PROPAGATION AT REGIONAL DISTANCES IN FIVE AREAS OF THE WORLD
A. Z. Der, A. ODonnell, T. W. McElfresh, R. Jutila, J. A. Burnetti, M Marshall, M. Silk, and E. Gordon 8 Feb. 1982 211 p refs
(Contract F08606-79-C-0007; ARPA Order 2551)
(AD-A120589; SDAC-TR-81-12; VSC-TR-82-14) Avail: NTIS HC A10/MF A01 CSCL 08/11

Propagation and excitation of regional phases in southern Africa, the southwestern United States, the Pakistan-India region, South America, and the Kamchatka-Kuriles region were studied. Comparison of the shield areas of South America, Pakistan and southern Africa reveals no appreciable differences in the excitation and attenuation of regional phases in these areas. On the other hand, excitation and attenuation rates for all regional phases are markedly different in the southwestern United States. The mountainous areas of South America are characterized by highly variable propagation characteristics, with Sn and Lg being absent from many seismograms studied. Attenuation of Sn and Lg is especially severe along the southern Andes mountains in Chile and Argentina. For these areas, the value of regional phases for detection and discrimination is highly questionable. The Andes region is also characterized by highly unusual seismograms with scattered, emergent phases resembling lunar seismograms. These problems are present, though to a much lesser degree, in the mountainous areas surrounding India and Pakistan. These areas are also characterized by highly variable propagation efficiency and by spatial attenuation that is higher than that of the shield. GRA

N83-16999# Texas A&M Univ., College Station. Dept. of Oceanography.
GEOCHEMISTRY OF PLUTONIUM AND OF URANIUM AND THORIUM SERIES NUCLIDES IN THE GULF OF MEXICO: SUMMARY OF PROGRESS Summary Report
Martha R. Scott 1981 24 p refs
(Contract DE-AS05-76EV-03852)
(DE82-004317; DOE/EV-03852) Avail: NTIS HC A02/MF A01

A summary outline of research on plutonium and naturally occurring radionuclides in the Gulf of Mexico and its contributing rivers is presented. Analytical procedures have been established; river sediments, river water, and marine sediments have been extensively sampled and analyzed for radionuclides and geochemically significant stable elements. DOE

N83-17000# Los Alamos Scientific Lab., N. Mex.
LITHOLOGY AND HYDROTHERMAL ALTERATION DETERMINATION FROM WELL LOGS FOR THE CERRO PRIETO WELLS, MEXICO
Iraj Ershaghi, Shahed Ghaemian, and Doddy Abdassah Oct. 1981 33 p refs
(Contract W-7405-eng-36)
(DE82-004677; LA-9075-MS) Avail: NTIS HC A03/MF A01

The characteristics of geophysical well logs are compared against the sand-shale series of the sedimentary column of the Cerro Prieto Geothermal Field, Mexico. It is shown that the changes in mineraology of the rocks because of hydrothermal alteration are not easily detectable on the existing logs. However, if the behavior of clay minerals alone is monitored, the onset of the hydrothermally altered zones may be estimated from the well logs. The effective concentration of clay-exchange cations, Q/sub v/, is computed using the data available from conventional well logs.

Zones indicating the disappearance of low temperature clays are considered hydrothermally altered formations with moderate to high permeability and temperature, and suitable for completion purposes. DOE

N83-17001# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

TERRESTRIAL SOLAR SPECTRAL DATA SETS

Richard E. Bird and Roland L. Hulstrom Jun. 1982 35 p refs (Contract DE-AC02-77CH-00178)

(DE83-000504; SERI/TR-642-1149) Avail: NTIS HC A03/MF A01

The needed solar spectra irradiance data sets representative of solar spectra under average conditions in the United States, are presented. Two new spectral irradiance data sets update two standards. One data set is for the direct normal irradiance within a 5.80 field of view, and the other set is for the global irradiance falling on a flat surface. The data are generated from a new extraterrestrial spectrum and a Rayleigh scattering calculation. The performance of solar products are compared, and absorptance, reflectance, transmittance, and responses of various devices and materials are evaluated. DOE

N83-17002# Sandia Labs., Albuquerque, N. Mex.

QUASI-STATIC ROCK MECHANICS DATA FOR ROCKSALT FROM THREE STRATEGIC PETROLEUM RESERVE DOMES

Ronald H. Price, Wolfgang R. Wawersik, David W. Hannum, and Jeffrey A. Zirzow Dec. 1981 47 p refs (Contract DE-AC04-76DP-00789)

(DE82-006869; SAND-81-2521) Avail: NTIS HC A03/MF A01

Triaxial compression and extension experiments were run on rocksalt samples from three strategic petroleum reserve (SPR) domes. Seventeen quasistatic tests were loaded at mean stress rates of .66 to 1.04 psi/sec, confining pressures of 14.5 to 2000 psi and temperatures of 22 to 100 deg C. The mechanical data from the three domes are similar, and they are consistent with previously published data. It is found that ultimate sample strengths are directly related to confining pressure and indirectly related to temperature, while ductility increases with both pressure and temperature. DOE

N83-17003# Tera Corp., Berkeley, Calif.

SOURCE CHARACTERIZATION OF SELECTED NORTH CASPIAN EVENTS FROM THE RELATIVE EXCITATION OF REGIONAL PHASES Final Report

Mansour Niazi Nov. 1981 147 p refs Prepared for California Univ., Lawrence Libermore Lab. (Contract W-7405-eng-48)

(DE82-006858; UCRL-15428) Avail: NTIS HC A07/MF A01

Seismograms of seven recent events (presumed underground nuclear explosions) which occurred during 1976-1979 in the North Caspian Sea region of the western Soviet Kazakh are compared at regional distances for their relative source excitation characteristics. The body wave magnitude estimates of these events range from 5.1 to 6.0. The data consist of analog and digital records collected at stations ranging in instrumental sophistication from temporary sites with single component smoke drum capability to those of SRO. ASRO and array (ILPA) configurations with digitally recorded down hole observations. The amplitude and frequency measurements of the analog seismograms for the first arrival and the peak amplitude of P coda as well as for the clear S wave signals recorded for different events at the same station are compared. DOE

N83-17004# Los Alamos Scientific Lab., N. Mex.

NUMERICAL PREDICTION OF SUBSIDENCE WITH COUPLED GEOMECHANICAL-HYDROLOGICAL MODELING

S. P. Girrens, C. A. Anderson, J. G. Bennett, and M. Kramer 1981 9 p refs Presented at the Workshop on Surface Subsidence due to Underground Mining, Morgantown, W. Va., 30 Nov. - 2 Dec. 1981 (Contract W-7405-eng-36)

(DE82-006136; LA-UR-81-3700; CONF-811173-1) Avail: NTIS HC A02/MF A01

A coupled finite element geomechanical-hydrology code is currently under development for application to the problem of predicting groundwater disturbances associated with mine subsidence. The structural-fluid coupling is addressed by calculating the subsided mine geometry, with emphasis placed on determining the strata disturbance and locating damaged regions, for input into a hydrology code, which determines localized volume flow rates and aquifer fluctuations. Benefits from coupling will be best realized when field measurements, an additional aspect of the study concurrent with analytical investigations, indicating the relationship between increasing rock strain and increasing permeability are incorporated into hydraulic material descriptions. Hydrologic and structural calculatons are presented to demonstrate computational capabilities applicable to mine subsidence. DOE

N83-17005# California Univ., Livermore. Lawrence Livermore Lab.

STRATOSPHERIC WATER VAPOR

Hugh W. Ellsaesser Dec. 1981 52 p refs Presented at the AGU Fall Meeting, San Francisco, 7-11 Dec. 1981 Submitted for publication (Contract W-7405-eng-48)

(DE82-010757; UCRL-83611-Rev-1; CONF-811211-2-Rev-1) Avail: NTIS HC A04/MF A01

A tutorial review of the understanding of stratospheric H2O and the processes controlling it is presented. Paradoxes posed by currently available observational data are cited and suggestions made as to how they might be resolved. Such resolution appears to require that the bulk of current data provides unrepresentative and misleading vertical and latitudinal H2O gradients immediately downstream from the tropical tropopause and that there exists within the troposphere a mechanism different from or in addition to the tropical tropopause cold trap for drying air to the mixing ratios found in the lower stratosphere. Satisfaction of these requirements will reconcile much heretofore puzzling observational data and will obviate the necessity for a stratospheric sink for H2O. DOE

N83-17006# Sandia Labs., Albuquerque, N. Mex. Ground Motion and Seismic Div.

RUMMY HIGH-ALTITUDE PRESSURE MEASUREMENTS AND ANALYSIS

John R. Banister and William V. Hereford Jan. 1982 22 p refs Presented at the 6th Symp. on Temp., Washington, D.C., 14-18 Mar. 1982 (Contract DE-AC04-76DP-00789)

(DE82-011681; SAND-81-2215; CONF-820306-1) Avail: NTIS HC A02/MF A01

Five pressure-measurement canisters equipped with parachutes were deployed from an A7C aircraft on the Rummy test. Their altitudes above Yucca flat were over 8.5 km when the pressure pulse arrived. Three successful measurements were obtained. These time histories showed a more complicated behavior than histories obtained on Pahute Mesa tests because the Rummy event developed double spall closures over a large area. Excellent agreement was obtained between the observed pressure histories and those calculated from surface acceleration measurements. The Yucca Flat terrain was so level that pressure pulses were not appreciably changed or weakened by elevation differences. DOE

N83-17007# Uppsala Ionospheric Observatory (Sweden).

[ASTRONOMICAL ACTIVITIES IN SWEDEN] Annual Report, 1981

1981 52 p refs

(UIO-AR-81-03) Avail: NTIS HC A04/MF A01

Activities within the research program during 1981 are summarized. Major advances include the first observation of stimulated electromagnetic emission associated with ionospheric modification (HEATING) experiments; detection on sounding rockets of electrostatic emissions with complex fine structure around the lower hybrid resonance frequency; and interpretation of earlier sounding rocket studies of the conditions around the

cold artic summer mesopause leading to a model of the formation of noctilucent clouds. The development of computer programs for the EISCAT data analysis and the completion of the design of a wave experiment for the Viking satellite are described.
Author (ESA)

N83-17008# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
ROCKET AND GROUND-BASED STUDY OF AN AURORAL BREAKUP EVENT
G. Marklund, W. Baumjohann (Muenster Univ., West Ger.), and I. Andahl (Kiruna Geophys. Inst., Sweden) Feb. 1982 35 p refs Sponsored by Swedish Board of Space Activites and Deutsche Forschungsmeinschaft
(TRITA-EPP-82-02; ISSN-0348-7539) Avail: NTIS HC A03/MF A01

A rocket was launched shortly after the onset of an intense magnetospheric substorm. Rocket electric field and particle observations were used to calculate ionospheric currents and heating rates. Results are consistent with ground magnetic and optical observations. Comparison of this event with a prebreakup event earlier in the day shows that the ionospheric substorm-related electric field can be divided into an ambient LT dependent field, probably of magnetospheric origin, and, superimposed on this, a small-scale electric field associated with the bright auroral structures, being southward for both events. This is shown to have important consequences on the location of the ionospheric currents and the Joule energy dissipation relative to the auroral forms. For example, in the prebreakup arc, Joule energy dissipation and particle energy flux are anticorrelated, while in the breakup case they are correlated. Author (ESA)

N83-17009# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
DOUBLE LAYERS IN SPACE
P. Carlqvist Jul. 1982 37 p refs Presented at Symp. on Plasma Double Layers, Risoe, Denmark, 16-18 Jun. 1982
(TRITA-EPP-82-07; ISSN-0348-7539) Avail: NTIS HC A03/MF A01

Rocket, satellite, and ground based experimental and observational evidence for the existence of electrostatic double layers in the Earth ionosphere and magnetosphere is reviewed. It is concluded that observational evidence for double layers in space is very strong. Experimental results indicate that double layers with widely different properties may exist in space. Author (ESA)

N83-17010# SRI International Corp., Menlo Park, Calif.
THE IMPACT OF STRATOSPHERIC OZONE ON TROPOSPHERIC AIR QUALITY: IMPLICATIONS FROM AN ANALYSIS OF EXISTING FIELD DATA Final report
William Viezee, Hanwant B. Singh, and Hisao Shigeishi Feb. 1982 135 p refs Sponsored by Coordinating Research Council, Inc. (Contract CAPA-15-76-1-80; SRI Proj. 1140)
(PB82-256231; CRC-APRAC-CAPA-15-76) Avail: NTIS HC A07/MF A01 CSCL 04A

A study with the overall objective to collect, survey, and analyze comprehensive existing ozone, beryllium-7, and meteorological data from the North American continent to determine the stratospheric component of ground-level ozone is discussed. The specific objective was to quantify the mean as well as the upper and lower bounds of this component, with emphasis on short-term effects as a function of season and geographic location. GRA

N83-17011# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
PROCEEDINGS OF A WORKSHOP ON SATELLITE DRAG
May 1982 264 p refs Workshop held at Boulder, Colo., 18-19 Mar. 1982
(PB82-253113; NOAA-82070204) Avail: NTIS HC A12/MF A01 CSCL 04A

Utilization of observed and predicted sunspot numbers, 10.7 cm solar flux values, and the geomagnetic K and A indices as inputs to calculate model neutral atmospheres at the appropriate satellite altitudes was addressed. These models are largely empirical, and especially during times of disturbed magnetic conditions operational tolerances for expected satellite drag are exceeded. Topics discussed include: The Operational Problems of Satellite Drag; Atmospheric Density Models; Model inputs and indexes, Existing and Proposed; and Thermospheric Models and their Applicability of Real Time Satellite Drag Problems. GRA

N83-17397*# University of Western Kentucky, Bowling Green. Dept. of Physics and Astronomy.
MAGNETOSPHERIC RAY TRACING STUDIES
N. Frank Six *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 19 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 03B

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N83-17012*# Research Inst. of Colorado, Fort Collins.
THE SPACEBORNE GLOBAL CLIMATE OBSERVING CENTER (SGCOC): EXECUTIVE SUMMARY Final Report
T. H. VonderHaar, S. Cox, T. B. McKee, and E. Raschke Jun. 1982 49 p refs
(Contract NAS5-26343)
(NASA-CR-170481; NAS 1.26:170481) Avail: NTIS HC A03/MF A01 CSCL 04B

Conceptual planning of the Spaceborne portion of the Global Climate Observing Systems (SGCOS) is reviewed. Fundamentals of the SGCOS are summarized. Author

N83-17013*# Texas A&M Univ., College Station.
THE AVE/VAS 2: THE 25 mb SOUNDING DATA Interim Report
Meta E. Sienkiewicz Dec. 1982 307 p refs
(Contract NAS8-34133)
(NASA-CR-170691; NAS 1.26:170691) Avail: NTIS HC A14/MF A01 CSCL 04B

The rawinsonde sounding program for the AVE/VAS II experiment is described and tabulated data at 25 mb intervals are presented. Soundings were taken at 3 hr intervals, was an 18 hour period. An additional sounding was taken at the normal synoptic observation time. The processing soundings method is discussed, estimates of the RMS errors in the data are presented, and an example of contact data is given. Termination pressures of soundings taken in the meso-beta-scale network are tabulated, as are observations of ground temperature at a depth of 2 cm. E.A.K.

N83-17014*# Crane Co., Burbank, Calif.
USER'S MANUAL FOR THE REEDM (ROCKET EXHAUST EFFLUENT DIFFUSION MODEL) COMPUTER PROGRAM Final Report, Jan. 1981 - Jul. 1982
J. R. Bjorklund, R. K. Dumbauld, C. S. Cheney, and H. V. Geary Washington NASA Dec. 1982 166 p refs
(Contract NAS8-34132)
(NASA-CR-3646; NAS 1.26:3646; TR-82-152-01) Avail: NTIS HC A08/MF A01 CSCL 21H

The REEDM computer program predicts concentrations, dosages, and depositions downwind from normal and abnormal launches of rocket vehicles at NASA's Kennedy Space Center. The atmospheric dispersion models, cloud-rise models, and other formulas used in the REEDM model are described mathematically Vehicle and source parameters, other pertinent physical properties of the rocket exhaust cloud, and meteorological layering techniques are presented as well as user's instructions for REEDM. Worked example problems are included. A.R.H.

N83-17015*# Cramer (H.E.) Co., Inc., Salt Lake City, Utah.
PROGRAM LISTING FOR THE REEDM (ROCKET EXHAUST EFFLUENT DIFFUSION MODEL) COMPUTER PROGRAM Final Report

J. R. Bjorklund, R. K. Dumbauld, C. S. Cheney, and H. V. Geary Washington NASA Dec. 1982 305 p
(Contract NAS8-34132)
(NASA-CR-3647; TR-82-152-01; NAS 1.26:3647) Avail: NTIS HC A14/MF A01 CSCL 04B

The program listing for the REEDM Computer Program is provided. A mathematical description of the atmospheric dispersion models, cloud-rise models, and other formulas used in the REEDM model; vehicle and source parameters, other pertinent physical properties of the rocket exhaust cloud and meteorological layering techniques; user's instructions for the REEDM computer program; and worked example problems are contained in NASA CR-3646. Author

N83-17016# Lincoln Lab., Mass. Inst. of Tech., Lexington.
FAA WEATHER SURVEILLANCE REQUIREMENTS IN THE CONTEXT ON NEXRAD
Bruce G. Laird and James E. Evans 19 Nov. 1982 183 p refs
(Contracts DTFA01-80-Y-10546; F19628-80-C-0002)
(FAA-RD-81-111; ATC-112) Avail: NTIS HC A09/MF A01

Weather radar surveillance requirements are identified and the technical issues that arise in attempting to meet these requirements with next generation weather radars the (NEXRAD) strawman radar sensors and siting are examined. Current air traffic control (ATC) weather data usage and statics of aviation weather hazards and system efficiency are used to prioritize products needed for ATC. The strawman NEXRAD capability is then reviewed in the context of the identified weather products and factors such as: (1) effects of front end noise and weather return statistics; (2) resolution and low altitude coverage constraints; (3) the clutter environment associated with various siting options, and (4) data quality required for real time automated display of hazardous weather regions to ATC controllers. It is concluded that significant problems will arise in attempting to simultaneously provide terminal and en route weather surveillance by a single radar as envisioned in the NEXRAD strawman. An analytical/experimental research and development program is described to resolve the identified technical uncertainties in the NEXRAD strawman design for FAA applications. Author

N83-17017*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
THE MEASUREMENT OF THE GROUND WIND STRUCTURE AT WALLOPS ISLAND Final Report
H. W. Tielman Nov. 1981 288 p refs
(Grant NGL-47-004-67)
(NASA-CR-156888; NAS 1.26:156888; VPI-E-81-30) Avail: NTIS HC A13/MF A01 CSCL 04B

The mean and turbulence characteristics of the surface wind measured near the Atlantic coast were measured. The experimental data were acquired from a 76 meter tall instrumented micrometeorological tower. Mean wind and turbulence measurements were made with two types of instrumentation consisting of cup vane and temperature probes, primarily used for mean profile measurements of velocity and temperature respectively. The second system, a hot film and thermocouple system, was used for measurement of turbulence variances and covariances and spectra. The cup vane system was used to acquire data from all wind directions, while the hot film system was primarily used for turbulence measurements from the two prevailing wind directions, south and northwest. The micrometeorological tower is a self standing nonguyed tower with five working platforms at 15.2m (50 ft.) intervals, with cup vane and aspirated temperature probes mounted at each platform. S.L.

N83-17018# Range Commanders Council, White Sands Missile Range, N. Mex. Meteorology Group.
A GLOSSARY OF SELECTED METEOROLOGY TERMS Final Report
Sep. 1982 137 p Sponsored in part by Army
(AD-A120379; RCC/MG-351-82) Avail: NTIS HC A07/MF A01 CSCL 05/2

The atmospheric, oceanographic, nuclear, and electro-optical terminology contained in this publication was compiled by the Ad Hoc Glossary Committee of the Meteorology Group (MG) of the Range Commanders Council. Much of the material appearing in this glossary was developed using information from several U.S. Government publications and the Glossary of Meteorology. GRA

N83-17019# Naval Postgraduate School, Monterey, Calif.
ANALYSIS OF ANTARCTIC REMOTE-SITE AUTOMATIC WEATHER STATION DATA FOR PERIOD JANUARY 1979 - FEBRUARY 1980 M.S. Thesis
Kurt Michael Scarbro Jun. 1982 79 p refs
(AD-A120383) Avail: NTIS HC A05/MF A01 CSCL 04/2

The second generation of the Stanford University developed Automatic Weather Station (AWS-2A) was placed at seven remote locations in the Antarctic in early 1979. Data transmissions were received via the NIMBUS VI platform from the Goddard Space Flight Center. Quality and amount of data received from the seven stations varied greatly, with many periods of sporadic reporting or none at all. The processing of the data from mid January 1979 early February 1980 was done with the goal of determining its credibility and its usefulness to the United States Antarctic mission as managed by the National Science Foundation. Various statistical measures were applied to the reported meteorological observations of surface pressure, wind and ambient air temperature, following closely the approach used by Renard and Salinas on AWS-1 data in 1976-1977. Emphasis was also placed on AWS-2A contributions to identifying mesoscale features around McMurdo Sound, Antarctica. Also discussed are two Adrams Buoy sites, set up as interim observation platforms between the AWS-1 and AWS-2A deployment. Author (GRA)

N83-17020# Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
WIND-WAVE INTERACTIONS UNDER THE INFLUENCE OF THE SOMALI LOW-LEVEL JET
S. A. Hsu 1982 7 p refs
(Contract N00014-75-C-0192)
(AD-A120222; TR-355) Avail: NTIS HC A02/MF A01 CSCL 04/2

Since the speed of the Somali low-level jet may reach 40 m/s in certain regions over the Indian Ocean during the summer, a constant value for the drag coefficient, C sub 10, has been found inadequate for many air-sea interaction studies such as heat flux and evaporation computations. During MONEX 1979 (May and June), high-resolution rawinsonde stations were set up at Mogadishu and at Gardo, in Somalia, to measure the structure of this jet. Simultaneous observations of surface winds and waves downwind from the jet were made by research and merchant ships. It is the purpose of this paper to study the significant heights and periods of sea waves under the influence of the Somali jet. In order to improve input to the study of atmosphere-ocean systems, such as heat budget, wave and current forecasting, and numerical modeling of the marine boundary layer, a recently developed wind stress formulation which incorporates wave-breaking characteristics is also investigated. GRA

N83-17021# Systems and Applied Sciences Corp., Riverdale, Md.
SPECTRAL CHARACTERISTICS OF THE GLOBAL MOISTURE DISTRIBUTION AND THEIR IMPORTANCE IN OBJECTIVE ANALYSIS OF MOISTURE FOR NWP MODELS
Donald C. Norquist and Chris Johnson Hanscom AFB, Mass. AFGL 14 Jul. 1982 63 p refs
(Contract F19628-82-C-0023; AF Proj. 6670)
(AD-A120397; SR-1; AFGL-TR-82-0190) Avail: NTIS HC A04/MF A01 CSCL 04/2

Using data sets of observation of atmospheric variables on a global scale, the spectral distribution of atmospheric moisture is compared with that of wind and mass fields. Results show that, spectrally, the wind field has more of its powr in higher wave numbers, than does moisture. Moisture has a shift in its power toward higher wave number with altitude, contrasting with a greater concentration of power in low wave numbers with altitude

for geopotential. A baseline against which objective analysis methods for the respective variables may be tested is established, to determine how accurately each method represents the obseved field. It is concluded on the basis of the unique characteristics of the moisture spectrum that special attention should be given to the design of a moisture analysis method. GRA

N83-17022# Los Alamos Scientific Lab., N. Mex.
TORNADO MECHANISM
Stirling A. Colgate 1982 6 p refs Presented at the 12th Conf. on Severe Local Storms, San Antonio, 11-15 Jan. 1982 Submitted for publication
(Contract W-7405-eng-36)
(DE82-002401; LA-UR-81-2951; CONF-820105-2) Avail: NTIS HC A02/MF A01

Several aspects of a tornado vortex are considered. The radius of the core is determined by the pressure defects, the specific angular momentum and the principle of maximum dissipation rate. The swirl ratio is then a result, not a cause. The pressure deficit is a result of core buoyancy relative to the surroundings and height. The height is limited by the aspect ratio and in turn by the limiting torque that can be transmitted by a turbulent fluid. Finally, droplets are centrifuged out of the core by centrifugal force allowing frictional heating in the turbulent core to take place on a dry adiabat. This adds 40% to the necessary buoyancy of the core, but does not fully explain tornado velocities. DOE

N83-17023# Pacific Northwest Lab., Richland, Wash.
THE WIND CHARACTERISTICS PROGRAM
L. L. Wendell Oct. 1981 12 p refs Presented at the Wind Workshop 5, Washington, D.C., 7-9 Oct. 1981
(Contract DE-AC06-76RL-01830)
(DE82-005226; PNL-SA-9741; CONF-811043-14) Avail: NTIS HC A02/MF A01

Wind characteristics research activities over the past 4 years focused on the areas of wind resource assessment, site selection and evaluation techniques, and on wind characteristics for wind turbine design, performance and operations evaluation. An analysis of the wind resources of the United States and its territories was completed that shows the greatest area of high wind power resource to be in the midsection of the country. High wind power is available in other sections of the country and is described in some detail on a state-by-state basis in twelve regional atlases. To carry the wind prospectin process to a finer scale, site selection techniques for small and large wind turbines were developed, tested, and documented. There is a broad range of sophistication and reliability in these techniques and their application must be matched with the priorities and time available for energy planning efforts. The nature of wind gustiness was evaluated statistically and modeled for calculating fatigue cycles and extreme events. DOE

N83-17024# Pacific Northwest Lab., Richland, Wash.
WORLD-WIDE RESOURCE ASSESSMENT
D. L. Elliot, C. I. Aspliden, and N. J. Cherry (Lincoln Coll.) Oct. 1981 13 p refs Presented at the 5th Bienn. Wind Energy Conf. and Workshop, Washington, D.C., 7-9 Oct. 1981
(Contract DE-AC06-76RL-01830)
(DE82-004272; PNL-SA-9742; CONF-811043-13) Avail: NTIS HC A02/MF A01

A world-wide wind energy resource assessment was carried out. The assessment was made using the methods recently developed to critically analyze all available wind data and previous assessments in order to estimate the broad-scale distribution of wind energy flux (WEF) over the world. Much of the data was used cautiously because of the lack of anemometer height and exposure information. Global pressure and wind patterns, upper air wind data and boundary layer meteorology were used to obtain a consistent estimate of the wind energy resource. The assessment made refers to the magneitude of the WEF at 50 m above ground level at typical open, well-exposed sites. It is presented on a world map with the assessment presented on a color scale of wind energy class. DOE

N83-17025# Vitro Labs., West Orange, N.J.
AUGUST 1982 ENVIRONMENTAL DATA FOR SITES IN THE NATIONAL SOLAR DATA NETWORK
1982 103 p
(Contract DE-AC01-79CS-30027)
(DE83-000066; SOLAR/0010-82/08) Avail: NTIS HC A06/MF A01

Environmental data were tabulated for 26 sites in the National Solar Data Network for the month of August. The data include: insolation, temperature, wind, and humidity. The instruments used to obtain the data are also discussed. DOE

N83-17026# Johns Hopkins Univ., Baltimore, Md. Program of Civil Engineering.
SIMULATION OF WIND-SPEED TIME SERIES FOR WIND-ENERGY CONVERSION ANALYSIS Final Report
R. B. Corotis Jun. 1982 78 p refs Prepared for Pacific Northwest Laboratory, Richland, Wash.
(Contract DE-AC06-76RL-01830)
(DE83-000043; PNL-4349) Avail: NTIS HC A05/MF A01

Sequential wind speeds recorded to investigate the operating characteristics of a wind energy conversion system. When data records are not available statistical characteristics of the wind speed data to calibrate a stochastic model and then generate a simulated wind speed time series are used. A simple wind speed simulation model, WEISIM, is developed based on the Weibull probability distribution for wind speeds with a correction based on the lag one autocorrelation value. The model simulates rates from one a second to one an hour, and wind speeds represent short term averages or longer term averages. The validity of the model is verified with PNL data for both histogram characteristics and persistance characteristics. DOE

N83-17027# Pennsylvania State Univ., University Park.
SPECTRA OVER COMPLEX TERRAIN IN THE SURFACE LAYER
H. A. Panofsky, J. A. Dutton, David Larko, Robert Lipschultz, and Gregory Stone Richland, Wash. Pacific Northwest Lab. Sep. 1982 99 p refs
(Contract DE-AC06-76RL-01830)
(DE83-000502; PNL-3745) Avail: NTIS HC A05/MF A01

Velocity spectra and other velocity statistics are estimated over three types of complex terrain: on tops of hills or escarpments; on land a shot distance downwind from a water body; and over rolling farm land. The most important characteristics of turbulence models over uniform terrain are summarized briefly. Theoretical aspects of spectral characteristics over complex terrain are discussed, followed by detailed observations over complex terrain and procedures for their estimation. A theory is presented for calculation of response of engineering systems to wind fluctuations. DOE

N83-17028# Pacific Northwest Lab., Richland, Wash.
CANDIDATE WIND-TURBINE-GENERATOR SITE SUMMARIZED METEOROLOGICAL DATA FOR THE PERIOD DECEMBER 1976 THROUGH DECEMBER 1981
W. F. Sandusky, D. S. Renne, and D. L. Hadley Sep. 1982 195 p
(Contract DE-AC06-76RL-01830)
(DE83-000884; PNL-4407) Avail: NTIS HC A09/MF A01

Summarized hourly meteorological data for 16 of the original 17 candidate and wind turbine generator sites collected during the period from December 1976 through December 1981 are presented. The data collection program at some individual sites may not span this entire period, but will be contained within the reporting period. The purpose of providing the summarized data is to document the data collection program and provide data that could be considered representative of long-term meteorological conditions at each site. For each site, data are given in eight tables and a topographic map showing the location of the meteorological tower and turbine, if applicable. Use of information from these tables, along with information about specific wind

turbines, should allow the user to estimate the potential for long-term average wind energy production at each site. DOE

N83-17029# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
THE WIND EMERGENCY RESPONSE SYSTEM
Alfred J. Garrett, Melvin R. Buckner, and Richard A. Mueller 1981 34 p refs Presented at the Am. Nucl. Soc. Winter Meeting, San Francisco, 29 Nov. - 4 Dec. 1981 Submitted for publication
(Contract DE-AC09-76SR-00001)
(DE82-010691; DP-MS-81-58; CONF-811103-108) Avail: NTIS HC A03/MF A01

The WIND system is an automated emergency response system for real time predictions of the consequences of liquid and airborne releases from SRP. The system consists of a minicomputer and associated peripherals necessary for acquisition and handling of large amounts of meteorological data from a local tower network and the National Weather Service. The minicomputer uses these data and several predictive models to assess the impact of accidental releases. The system is fast and easy to use, and output is displayed both in tabular form and as trajectory map plots for quick interpretation. The rapid response capabilities of the WIND system was demonstrated in support of SRP operations. DOE

N83-17030# Danish Meteorological Inst., Copenhagen.
METEOROLOGICAL YEARBOOK, 1980. PART 1: DENMARK AND FAROE ISLANDS (EXCEPT GREENLAND) Annual Report, 1980
1982 303 p In ENGLISH and DANISH
(ISBN-87-7478-202-9) Avail: NTIS HC A14/MF A01

The results of the standard observations carried out at the Arbog meteorological laboratory during 1980 are presented. The measurement show daily, monthly and annual means of air pressure, temperature, wind, humidity and precipitation. Monthly summaries of hours of sunshine and climatic maps are also included. Author (ESA)

N83-17031# Research Inst. of National Defence, Umea (Sweden).
DIMMA: A COMPUTER PROGRAM FOR FORECASTING FOG FORMATION [DIMMA: ETT DATORPROGRAM FOER PROGNOS AV DIMBILDNING]
Hans Renstroem and Edvard Karlsson Aug. 1982 55 p refs In SWEDISH
(FOA-C-40155-C1) Avail: NTIS HC A04/MF A01

A method for forecasting radiation fog, and mixed fog is presented. Two FORTRAN versions were developed, one on a VAX computer, the other on an HP computer. The calculation of the critical temperature is outlined. Author (ESA)

N83-17032# National Oceanic and Atmospheric Administration, Boulder, Colo. Office of Weather Research and Modification.
CASE STUDIES OF HYDROMETEORS IN FLORIDA CUMULI
Farn Parungo and Clarence Magamoto May 1982 55 p refs
(PB82-252396; NOAA-TM-ERL-OWRM-16; NOAA-82070202) Avail: NTIS HC A04/MF A01 CSCL 04B

Randomized (by day) dynamic seeding was conducted in the Florida Area Cumulus Experiment. An airborne Formvar replicator was used to collect and replicate hydrometeors. The replicas were examined with a scanning electromicorscope (SEM) to distinguish morphologically liquid drops, frozen drops, ice crystals in various habits, and graupel. The concentrations and size distributions of each category were measured. Using SEM, liquid drops were depicted as flat circles and frozen drops were depicted as 3-dimensional spheres. It was found that some unseeded clouds contained frozen drops even at relatively warm temperatures. The growth accretion, and riming of these frozen drops play an important role in natural cumulus development and in precipitation.
Author (GRA)

N83-17033# National Weather Service, Salt Lake City, Utah.
ANNUAL DATA AND VERIFICATION TABULATION EASTERN NORTH PACIFIC TROPICAL STORMS AND HURRICANES 1981
Emil B. Gunther et al Jun. 1982 28 p refs
(PB82-252420; NOAA-82070903; NOAA-TM-NWS-WR-175) Avail: NTIS HC A03/MF A01 CSCL 04B

Eastern North Pacific tropical cyclone activity is discussed. Verification statistics for the 1981 season are given. The forecast displacement error is the vector difference between the forecaster displacement and the actual displacement computed from best-track positions. A summary of the 1981 eastern North Pacific tropical cyclone statistics is included. GRA

N83-17034# National Oceanic and Atmospheric Administration, Miami, Fla. Oceanographic and Meteorological Labs.
THE STRUCTURE OF TYPHOON IRMA (1974) AS REVEALED BY 700-mb AIRCRAFT DATA
David P. Jorgensen Apr. 1982 64 p refs
(PB82-242769; NOAA-TR-ERL-418-AMOL-32; NOAA-82062503) Avail: NTIS HC A04/MF A01 CSCL 04B

Instrumented aircraft data for five days representing, roughly, the entire life cycle of the typhoon are analyzed. The data analyses are presented as horizontal cross sections and profiles of eight meteorological parameters: relative tangential wind, actual and relative radial wind, adjusted temperature, relative humidity, mixing ratio, adjusted D-value, and adjusted equivalent potential temperature. Author (GRA)

N83-17035# National Weather Service, Salt Lake City, Utah. Nuclear Support Office.
APPROXIMATIONS TO THE PEAK SURFACE WIND GUSTS FROM DESERT THUNDERSTORMS
Darryl Randerson Jun. 1982 25 p refs
(PB82-253089; NOAA-TM-NWS-WR-176; NOAA-82071903) Avail: NTIS HC A02/MF A01 CSCL 04B

Simple procedures for estimating the peak surface wind gusts from desert thunderstorms are proposed. It is assumed that the peak surface wind gust is related to the difference (Delta T) between the maximum ambient air temperature attained prior to the thunderstorm and the minimum temperature of the cooler air generated by the thunderstorm downdraft. Six different regression equations are developed. GRA

N83-17036# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
ENVIRONMENTAL RESEARCH LABORATORIES PROGRAMS 1981 AND PLANS 1982 Annual Report
Dec. 1981 129 p
(PB82-250978; NOAA-82070205) Avail: NTIS HC A07/MF A01 CSCL 04B

The highlights of the Environmental Research Laboratories accomplishments are presented with abbreviated summaries of immediate objectives. Each of the laboratories and program offices present their own summaries. Oceanography, aeronomy fluid dynamics, climate, air quality, and geophysics are among the topics discussed. GRA

N83-17369*# Texas A&M Univ., College Station. Dept. of Meteorology.
INVESTIGATION OF MESOSCALE METEOROLOGICAL PHENOMENA AS OBSERVED BY GEOSTATIONARY SATELLITE
Kenneth C. Brundidge *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 18 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 04B

N83-17385*# Mississippi Univ., University. Dept. of Physics and Astronomy.
IN SITU MEASUREMENTS OF THUNDERSTORM ELECTRICAL PROPERTIES
Thomas C. Marshall *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 6 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 04B

N83-17389*# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.

AGEOSTROPHIC WINDS IN THE SEVERE STROM ENVIRONMENT
James T. Moore *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 04B

N83-17398*# Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
MODIFICATION AND EVALUATION OF A BARNES-TYPE OBJECTIVE ANALYSIS SCHEME FOR SURFACE METEOROLOGICAL DATA
David R. Smith *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 23 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 04B

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N83-17037# Illinois Univ., Urbana. Dept. of Physics.
THEORETICAL STUDIES OF THE OCEANIC INTERNAL WAVE SYSTEM Final Report, 15 Jun. 1980 - 30 Jun. 1982
Jon Wright 31 Aug. 1982 120 p refs
(Contract N00014-80-C-0840)
(AD-A119720) Avail: NTIS HC A06/MF A01

In this paper we apply a formalism introduced in a previous paper to write down a self-consistent set of equations for the functions that describe the near-equilibrium time behavior of random oceanic internal waves. These equations are based on the Direct Interaction Approximation. The self-consistent equations are solved numerically (using the Garrett-Munk spectrum as input) and the results are compared to parameters obtained in the weak interaction approximation (WIA). The formalism points out that an extra parameter that is implicitly vanishingly small in the WIA has a significant effect on decay rates when computed self-consistently. We end by mentioning possible future self-consistent calculations that would improve upon our own. Author (GRA)

N83-17038# Brookhaven National Lab., Upton, N. Y. Atmospheric Sciences Div.
VARIATION OF TURBULENCE IN A COASTAL THERMAL INTERNAL BOUNDARY LAYER
S. SethuRaman, G. S. Raynor, and R. N. Brown 1981 4 p refs Presented at the 3rd Joint Conf. on Appl. of Air Pollution Meteorol., San Antonio, 11-15 Jan. 1982 Submitted for publication
(Contract DE-AC02-76CH-00016)
(DE81-031960; BNL-30045; CONF-820101-4) Avail: NTIS HC A02/MF A01

Results of some observations of the vertical component of turbulence made in a coastal thermal internal boundary layer over Long Island, New York from 1974 to 1978 are reported. Vertical turbulence measured by a simple sail plane variometer in a thermal internal boundary layer over Long Island with onshore flows indicates the structure to depend significantly on the land-water temperature difference. The position of the vertical velocity fluctuation maximum seems to vary from one test to another but is variation could not be correlated to other parameters due to lack of a sufficient number of tests. The structure of vertical turbulence was found to be different for sea breeze flows as compared to gradient winds. DOE

N83-17039# Oregon State Univ., Newport. Marine Science Center.
THE USE OF PLUTONIUM ISOTOPE ACTIVITY RATIOS IN DATING RECENT SEDIMENTS
T. M. Beasley 1982 22 p refs
(Contract DE-AT06-76EV-70030)
(DE82-011082; DOE/EV-70030/9) Avail: NTIS HC A02/MF A01

The majority of plutonium presently in the biosphere has come from the testing of nuclear devices. In the early 1950s, the Pu-238/239+240 activity ratio of fallout debris was > 0.04; in the more extensive test series of 1961 to 1962, the Pu-238/239+240 activity ratios were quite consistent at 0.02 to 0.03 and maximum fallout delivery occurred in mid-1963. A significant perturbation in Pu isotope activity ratios occurred in mid-1966 with the deposition of Pu-238 from the SNAP-9A reentry and burn-up. Recently deposited sediments have recorded these events and where accumulation rates are rapid (> 1 cm/y), changes in Pu isotope activity ratios can be used as a geochronological tool. DOE

N83-17040# Miami Univ., Fla. School of Marine and Atmospheric Science.
A COMPARISON OF TECHNIQUES FOR PRESERVING DISSOLVED NUTRIENTS IN OPEN-OCEAN SEAWATER SAMPLES
John W. Morse, Mary Hunt (California Univ., Berkeley, Lawrence Berkeley Lab.), James Zullig, Alfonso Mucci, and Tony Mendez Berkeley, Calif. California Univ., Lawrence Berkeley Lab. Dec. 1981 40 p refs
(Contract W-7405-eng-48)
(DE82-011097; LBL-13914) Avail: NTIS HC A03/MF A01

Filtration and type of filter, material and history of storage containes, the influence of light, storage temperature and how it is achieved, the effectiveness of various acids, poisons, and preservatives, and the source of the sample. Nutrient preservation techniques on surface and deep seawater samples collected in the Gulf Stream east of Miami, Florida were studied. No preservation techniques were found to be satisfactory for near surface open ocean seawater. Results for deep water samples are found to be substantially better. Storage of filtered samples in aged polyethylene bottles at 2 C in the dark is recommended for sample storage. DOE

N83-17041# Rhode Island Univ., Kingston. School of Oceanography.
ANOXIC NUTRIENT REGENERATION AND THE EUTROPHICATION OF ESTUARINE WATERS Final Report, 1 Oct. 1978 - 28 Feb. 1981
Scott W. Nixon and Patrick F. Roques 1981 119 p refs
(PB83-108027; W83-00263; OWRT-B-082-R(1)) Avail: NTIS HC A06/MF A01

The rates and stoichiometry of nutrient regeneration from sedimenting organic matter were investigated in the Pettaquamseutt River estuary under anoxic and oxic conditions. This estuary exhibits high organic matter sedimentation and reduced water circulation. It was observed that oxygen consumption in the water sediments exceeds renewal processes and anoxic conditions develop. The stoichiometry of nutrient concentrations in the anoxic bottom water indicates that the nitrogen and phosphorus regenerated is greater than expected from anoxic zone sediment trap material. Organic matter oxidation rates and nutrient regeneration stoichiometry were directed measured by using chambers placed over the sediment and monitoring concentration changes in the isolated bottom water. These data permit testing of recent models for organic decomposition under anoxic conditions. Author (GRA)

N83-17042# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
ANALYSIS METHODS FOR NARROW-BEAM HIGH-FREQUENCY RADAR SEA ECHO
Belinda J. Lipa and Donald E. Barrick Apr. 1982 62 p refs
(PB82-252123; NOAA-TR-ERL-420-WPL-56; NOAA-82062405)
Avail: NTIS HC A04/MF A01 CSCL 08C

The analysis of high frequency (HF) radar sea echo is based on the interpretation of the echo power spectrum in terms of Barrick's equations for the radar cross section, to give parameters of the ocean wave, wind, and current velocity fields. To provide an analysis of these equations, a detailed review of analytical and computational techniques for application to narrow beam radars (both one and two beams) is presented. All equations necessary for application to sea echo are given and explained and references to earlier sources and derivations are cited. All essential computer

programs (coded in FORTRAN) required to implement these methods are provided and explained. GRA

N83-17043# National Geodetic Survey, Rockville, Md.
THE 3.5-YEAR GEOS-3 DATA SET
Russell W. Agreen Jan. 1982 14 p refs
(PB82-258237; NOAA-TM-NOS-NGS-33; NOAA-82072905) Avail: NTIS HC A02/MF A01 CSCL 08C

A revised GEOS-3 altimeter data set was produced by the National Ocean Survey/National Geodetic Survey (NOS/NGS). The resulting surface heights are smoothed over a shorter time (1 second) than the 'G' tape data set produced by the National Aeronautics and Space Administration (NASA), Wallops Flight Center. It also differs from the 'G' tape by not having a 'unique number' field, while possessing additional fields for the satellite height, Schwidershi ocean-tide height, Cartwright solid-tide height, and automatic gain control. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N83-17044 Royal Aircraft Establishment, Farnborough (England).
THE ROLE OF BOUND WATER IN THE ELECTRO-RHEOLOGICAL EFFECT
Yu. F. Deinega, K. K. Popko, and N. Ya. Kovganich Jun. 1982 8 p refs Transl. into ENGLISH from Dopov. Akad. Nauk. Ukr. RSR, Ser. B (USSR), no. 9, 1975 p 807-810
(RAE-Trans-2090; BR85534) Copyright. Avail: Issuing Activity

The dependence of electro-rheological effect upon hydration level of the disperse phase was studied using a 25% suspension of potato starch in vaseline oil. It is shown that as the moisture content of the disperse phase is increased, the electro-rheological effect passes through a maximum. As the electrical field intensity is increased, the positions of such maxima shift forwards lower moisture levels. The I/V characteristic is non-linear. It is to be noted that the electro-rheological maxima are attained at moisture contents consistent with the water being in a bound state. Author

N83-17045* National Aeronautics and Space Administration. Pasadena Office, Calif.
ENHANCEMENT OF IN VITRO GUAYULE PROPAGATION Patent
Minoo N. Dastoor (JPL, California Inst. of Tech., Pasadena), Wayne W. Schubert (JPL, California Inst. of Tech., Pasadena), and Gene R. Petersen, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 30 Jun. 1981 7 p Filed 30 Jun. 1981 Supersedes N81-29728 (19 - 20, p 2811) Sponsored by NASA (NASA-Case-NPO-15213-1; US-Patent-4,363,188; US-Patent-Appl-SN-280153; US-Patent-Class-47-58; US-Patent-Class-71-98) Avail: US Patent and Trademark Office CSCL 06C

A method for stimulating in vitro propagation of Guayule from a nutrient medium containing Guayule tissue by adding a substituted trialkyl amine bioinducing agent to the nutrient medium is described. Selective or differentiated propagation of shoots or callus is obtained by varying the amounts of substituted trialky amine present in the nutrient medium. The luxuriant growth provided may be processed for its poly isoprene content or may be transferred to a rooting medium for production of whole plants as identical clones of the original tissue. The method also provides for the production of large numbers of Guayule plants having identical desirable properties such as high polyisoprene levels.
Official Gazette of the U.S. Patent and Trademark Office

N83-17046*# National Aeronautics and Space Administration, Washington, D. C.
GLOBAL BIOLOGY RESEARCH PROGRAM: PROGRAM PLAN
Jan. 1983 111 p refs
(NASA-TM-85629; EBT-3; NAS 1.15:85629) Avail: NTIS HC A06/MF A01 CSCL 06C

Biological processes which play a dominant role in these cycles which transform and transfer much of this material throughout the biosphere are examined. A greater understanding of planetary biological processes as revealed by the interaction of the biota and the environment. The rationale, scope, research strategy, and research priorities of the global biology is presented. E.A.K.

N83-17047*# National Aeronautics and Space Administration, Washington, D. C.
PLANT SEEDS IN BIOLOGICAL RESEARCH IN SPACE
A. T. Miller Oct. 1982 16 p refs Transl. into ENGLISH from Izv. Akad. Nauk Latv. SSR (USSR), no. 7(372), 1978 p 82-89 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Latvian SSR Academy of Sciences
(Contract NASw-3541)
(NASA-TM-77163; NAS 1.15:77163) Avail: NTIS HC A02/MF A01 CSCL 06C

Data of 15 years of space flight and laboratory tests of plant seeds of 20 species, mainly on the combined and separate effects of launch vibration, ionizing radiation and weightlessness, are surveyed. It is concluded that plants do not show a pronounced response to space flight factors. Conditions of return to Earth, the number of heavy cosmic ray particles striking biological targets and effects of change in magnetic an electromagnetic fields have been little studied, and that more study of growing plants in space is needed. E.A.K.

N83-17048*# National Aeronautics and Space Administration, Washington, D. C.
USE OF PHYTOCHROME-DEPENDENT REACTION IN EVALUATING THE EFFECT OF SPACE FLIGHT FACTORS ON THE PLANT ORGANISM
B. A. Shteyne, L. V. Nevzgodina, and A. T. Miller Nov. 1982 11 p refs Transl. into ENGLISH from Izv. Akad. Nauk Latv. SSR (USSR), no. 11(412), 1981 p 94-99 Original language doc. announced as A82-31547 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Latvian SSR Academy of Sciences
(Contract NASw-3541)
(NASA-TM-77174; NAS 1.15:77174) Avail: NTIS HC A02/MF A01 CSCL 06C

The effects of space flight factors on lettuce seeds aboard the Kosmos-936 and Kosmos-1129 satellites for 20 days were studied. The phytochrome dependent (PD) reaction of light sensitive seeds was a sensitive criterion for evaluating the biological effects of space flight factors. The PD reaction of air dry lettuce seeds was suppressed after space flight, especially if the seeds were exposed to open space during the flight. Space flight affects the physiological activity of both phytochrome forms, and both the phi sub 730 dependent reactions of lettuce seeds were suppressed. E.A.K.

N83-17049# School of Aerospace Medicine, Brooks AFB, Tex.
TRAINING PROCEDURE FOR PRIMATE EQUILIBRIUM PLATFORM Final Report, Jan. - Mar. 1982
Danny Burke and C. Thomas Bennett Aug. 1982 10 p refs
(AF Proj. 7757)
(AD-A119978; SAM-TR-82-24) Avail: NTIS HC A02/MF A01 CSCL 14/2

Rhesus monkeys (M. Mulatta) were trained to maintain a primate equilibrium platform in a relatively horizontal position by a control stick. Training procedure consisted of seven phases. Progression from one phase to the next was contingent on successful completion of the current phase. Criterion for success was defined for each phase. GRA

N83-17050# Los Alamos Scientific Lab., N. Mex.
FUTURE RESEARCH ON ANIMAL TEMPERATURES USING ELECTRONIC EQUIPMENT
Sherrill B. Nott and Gary L. Seawright Nov. 1981 22 p refs
(Contract W-7405-eng-36)
(DE82-004682; LA-8883) Avail: NTIS HC A02/MF A01

Available literature on animal temperature is reviewed and

research priorities, using newly developed electronic identification and temperature-sensing equipment, are suggested. Applications to beef-cattle, dairy-cattle, and swine operations receive major attention. Skepticism of existing temperature data obtained with rectal thermometers is expressed. Physiological control of animal temperature is described as is the new monitoring technology (transponders and battery-operated radio transmitters). Primary emphasis is given to the diseases and managerial applications where temperature monitoring equipment is likely to be most profitable. DOE

N83-17051# Indiana Biolab, Palmyra.
MICROORGANISMS FOR FERMENTATION OF CROP RESIDUES Final Technical Report
Harold Eddleman 1981 2 p
(Contract DE-FG02-80R5-10222)
(DE82-006912; DOE/R5-10222/1) Avail: NTIS HC A02/MF A01

The construction of a device for freeze drying cultures and the accumulation of about 200 fungi which decompose cornstalks are described. DOE

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N83-17052* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 239, DECEMBER 1982
Dec. 1982 102 p
(NASA-SP-7011(239); NAS 1.21:7011(239)) Avail: NTIS HC A06 CSCL 06E

This bibliography lists 318 reports, articles and other documents introduced into the NASA scientific and technical information system in November 1982. Author

N83-17053*# National Aeronautics and Space Administration, Washington, D. C.
INVESTIGATION OF THE VASCULAR REACTION OF THE NASAL MUCOSA IN COSMONAUTS
I. Ya. Yakovleva and V. P. Baranova Dec. 1982 7 p refs Transl. into ENGLISH from Vest. Otorinolaringologii (USSR), no. 5, Sep. - Oct. 1982 p 44-46 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Inst. of Biomedical Problems, USSR Ministry of Public Health, Moscow
(Contract NASw-3541)
(NASA-TM-77180; NAS 1.15:77180) Avail: NTIS HC A02/MF A01 CSCL 06P

Rhinopneumometric examinations in 3 positions of the body were undertaken in 36 cosmonauts aged 25 to 45 years, 14 of whom participated in space flights of various lengths. The nasal vascular response standards were defined in persons of the group examined. A subjective characteristic of the nasal vascular, reactions arising during the flight is provided. Examinations of 14 people were performed before and after the space flight. The rise of intranasal resistance in the horizontal body position permits forecasting different degrees of nasal breathing disturbances during a period of acute adaptation to weightlessness owing to vasomotor alterations of the nasal mucous membrane. Author

N83-17054*# National Aeronautics and Space Administration, Washington, D. C.
THE INFLUENCE OF MOTOR ACTIVITY ON THE DEVELOPMENT OF CARDIAC ARRHYTHMIAS DURING EXPERIMENTAL EMOTIONAL STRESS
L. S. Ulyaninskiy, T. G. Urmancheyeva, Ye. P. Stepanyan, A. A. Fufacheva, A. V. Gritsak, B. A. Kuznetsova, and A. A. Kvitka Oct. 1982 12 p refs Transl. into ENGLISH from Kardiologiya (USSR), no. 10, Oct. 1981 p 64-67 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Academy of Medical Sciences, Moscow
(Contract NASw-3542)
(NASA-TM-77162; NAS 1.15:77162) Avail: NTIS HC A02/MF A01 CSCL 06S

Experimental emotional stress which can produce various disorders of cardiac rhythm: sinus tachycardia, atrial fibrillation, ventricular, extrasystoles and paroxysmal ventricular tachysystoles was studied. In these conditions the adrenalin content in the blood and myocardium is increased 3 to 4 times. It is found that moderate motor activity leads to a relative decrease of adrenalin in the myocardium and arrest of cardiac arrhythmias. E.A.K.

N83-17055*# Technology, Inc., Houston, Tex. Life Sciences Div.
NEUROPHYSIOLOGICAL RESPONSES TO STRESSFUL MOTION AND ANTI-MOTION SICKNESS DRUGS AS MEDIATED BY THE LIMBIC SYSTEM
Randall Lee Kohl and Stephanie Odell 12 Nov. 1982 74 p refs
(Contract NAS9-14880)
(NASA-CR-167776; NAS 1.26:167776) Avail: NTIS HC A04/MF A01 CSCL 06S

Performance is characterized in terms of attention and memory, categorizing extrinsic mechanism mediated by ACTH, norepinephrine and dopamine, and intrinsic mechanisms as cholinergic. The cholinergic role in memory and performance was viewed from within the limbic system and related to volitional influences of frontal cortical afferents and behavioral responses of hypothalamic and reticular system efferents. The inhibitory influence of the hippocampus on the autonomic and hormonal responses mediated through the hypothalamus, pituitary, and brain stem are correlated with the actions of such anti-motion sickness drugs as scopolamine and amphetamine. These drugs appear to exert their effects on motion sickness symptomatology through diverse though synergistic neurochemical mechanisms involving the septohippocampal pathway and other limbic system structures. The particular impact of the limbic system on an animal's behavioral and hormonal responses to stress is influenced by ACTH, cortisol, scopolamine, and amphetamine. Author

N83-17056*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
PHYSIOLOGICAL CORRELATES OF MENTAL WORKLOAD Final Report
Greg L. Zacharias Feb. 1980 116 p refs
(Contract NAS1-15192)
(NASA-CR-166054; NAS 1.26:166054; BBN-4308) Avail: NTIS HC A06/MF A01 CSCL 06P

A literature review was conducted to assess the basis of and techniques for physiological assessment of mental workload. The study findings reviewed had shortcomings involving one or more of the following basic problems: (1) physiologic arousal can be easily driven by nonworkload factors, confounding any proposed metric; (2) the profound absence of underlying physiologic models has promulgated a multiplicity of seemingly arbitrary signal processing techniques; (3) the unspecified multidimensional nature of physiological 'state' has given rise to a broad spectrum of competing noncommensurate metrics; and (4) the lack of an adequate definition of workload compels physiologic correlations to suffer either from the vagueness of implicit workload measures or from the variance of explicit subjective assessments. Using specific studies as examples, two basic signal processing/data reduction techniques in current use, time and ensemble averaging are discussed. Author

N83-17057*# Massachusetts Inst. of Tech., Cambridge. Man Vehicle Lab.
A HEURISTIC MATHEMATICAL MODEL FOR THE DYNAMICS OF SENSORY CONFLICT AND MOTION SICKNESS
Charles M. Oman 1982 48 p refs
(Contracts NAS9-15343; NCC9-1; Grant NsG-2032)
(NASA-CR-169766; NAS 1.26:169766; A-O-L-Sup-392) Avail: NTIS HC A03/MF A01 CSCL 06S

By consideration of the information processing task faced by the central nervous system in estimating body spatial orientation

and in controlling active body movement using an internal model referenced control strategy, a mathematial model for sensory conflict generation is developed. The model postulates a major dynamic functional role for sensory conflict signals in movement control, as well as in sensory-motor adaptation. It accounts for the role of active movement in creating motion sickness symptoms in some experimental circumstance, and in alleviating them in others. The relationship between motion sickness produced by sensory rearrangement and that resulting from external motion disturbances is explicitly defined. A nonlinear conflict averaging model is proposed which describes dynamic aspects of experimentally observed subjective discomfort sensation, and suggests resulting behaviours. The model admits several possibilities for adaptive mechanisms which do not involve internal model updating. Further systematic efforts to experimentally refine and validate the model are indicated. Author

N83-17058# Illinois Univ., Urbana.
COMPUTER AUTOMATION OF THE THERMAL PULSE TECHNIQUE FOR LOCAL BLOOD FLOW MEASUREMENTS M.S. Thesis
Kurt Lewis Baum 1982 79 p refs
(AD-A119041; AFIT-CI-NR-82-45T) Avail: NTIS HC A05/MF A01 CSCL 06/16

Tissue blood perfusion is a fundamental measurement in physiology that affects the entire spectrum of medical practice and research. A new and innovative method is under development by Dr. Kenneth R. Holmes and Dr. Michael M. Chen at the University of Illinois. Their thermal pulse-decay method utilizes a small thermistor to pulse heat the tissue under study. The thermistor is then used to record tissue temperature as the heat dissipates due to thermal conductivity and blood perfusion. From this cooling data, local blood perfusion can be calculated by various computer routines. The process of initiating and controlling the experiment, acquiring and storing the data, and calculating perfusion parameters has been computer automated. The system is based on a Digital Equipment Corporation LSI 11 minicomputer. The software package developed for the system is user oriented. It can control up to six probes at once, performing both heating and measurement tasks. The user is free to choose the duration of the heat pulses, as well as the sampling rate and sampling duration after the heat pulse. The program automatically generates a data file for each active probe. GRA

N83-17059# Vanderbilt Univ., Nashville, Tenn. Dept. of Psychology.
DEPTH CONSTANCY IN STEREOSCOPIC AFTERIMAGES: EFFECTS OF VIEWING DISTANCE AND MEASUREMENT METHOD
Robert H. Cormack Aug. 1982 35 p refs
(Contract N00014-81-C-0001; RR04209020)
(AD-A118970; N14-0001-82C-0003) Avail: NTIS HC A03/MF A01 CSCL 05/10

Stereoscopic depth constancy refers to the proposition that perceived depth signaled by retinal disparity remains constant despite changes in viewing distance. There has been some controversy as to whether stereoscopic depth constancy can operate at distance greater than a few meters. A previous study used a stereoscopic afterimage technique to determine whether depth constancy holds as fixation distance varies. After obtaining an afterimage containing depth information in the form of retinal disparity, observers set a depth probe equal in apparent distance to the disparate afterimage. The results showed that depth constancy persisted up to 27 meters. The present study was conducted to address two issues raised by the previous work. First, it is important to establish that stereoscopic depth constancy can be confirmed by measures which do not themselves depend on retinal disparity as the depth probe method does. Second, it is only beyond 27 meters of viewing distance that there are large departures in the predictions made by different models of depth constancy. GRA

N83-17060# Massachusetts General Hospital, Boston.
THE ROLE OF HIGH PRESSURE AND INERT GASES IN THE PRODUCTION AND REVERSAL OF THE HIGH PRESSURE NEUROLOGICAL SYNDROME Final Report, 1 Apr. 1978 - 31 Mar. 1982
Keith W. Miller 6 Aug. 1982 134 p refs
(Contract N00014-75-C-0727)
(AD-A118923) Avail: NTIS HC A07/MF A01 CSCL 06/16

The ability of narcotic or anesthetic gases when added to oxy-helium breathing mixtures (trimix) to increase the depth limit imposed by the high pressure neurological syndrome (HPNS) has been investigated. Five such gases all gave good protection with potencies related to their anesthetic potencies. A large extension of the safe diving limits can be achieved, but finally a point is reached when the HPNS can only be a further postponed by adding anesthetic levels of the second inert gas. Thus, there now exists a trimix barrier to yet deeper diving. The gas mixtures required to prevent the HPNS can be calculated using as simple model of their mechanism of action called the critical volume hypothesis. These and further studies indicate that the several phases of the HPNS have separate etiologies and it is possible to selectively modify with drugs each of these end points. Neurochemical studies show promise of providing a deeper understanding of the underlying mechanisms. Author (GRA)

N83-17061# California Univ., Livermore. Lawrence Livermore Lab.
STATUS OF MEASUREMENTS FOR RADIATION PROTECTION
Guy A. Armantrout 4 Dec. 1981 20 p refs
(Contract W-7405-eng-48)
(DE82-006180; UCID-19117) Avail: NTIS HC A02/MF A01

The Dose Equivalent Index (DEI) was proposed as a dosimetric standard. The impact of the change on health physics instrumentation measurements was considered and the probable errors of representative instruments for measuring the DEI were evaluated. Little change is found from earlier slab standards. A more important consideration is the appropriateness of the use of the DEI as a dosimetric standard. The DEI may be satisfactory from a conservative viewpoint, but is not necessarily proportional to the true radiological risks involved. An alternate parameter (such as the 1 cm depth dose equivalent for an isotropically irradiated 30 cm sphere as suggested by Kramer) may be more appropriate. DOE

N83-17062# Aberdeen Univ. (Scotland).
DOSIMETRIC CONSIDERATIONS IN NEUTRON ACTIVATION ANALYSIS IN VIVO
K. V. Ettinger, R. G. Fairchild (Brookhaven National Lab.), and S. H. Cohn (Brookhaven National Lab.) 1981 19 p refs Presented at the 4th Symp. on Neutron Dosimetry, Munich-Neuherberg, West Germany, 1-5 Jun. 1981
(Contract DE-AC02-76CH-00016)
(DE82-004700; BNL-30393; CONF-810673-5) Avail: NTIS HC A02/MF A01

The use of filtered low energy neutron beams from reactors and isotopic sources opens new possibilities for detection of trace elements, particularly in the brain. The low values of kerma/neutron in 24 and 2 KeV beams, together with a relatively small value of quality factor made it possible to utilize these for detection of Ca in skull with a negligible dose administered to the patient. Furthermore, for an acceptable radiation dose to the brain and satisfactory eye sparing the levels of mercury in brain can be determined using prompt gamma ray technique at much lower concentrations than in the past. The tailoring of neutron spectrum is finding applications in the detection of calcium in parts of the skeleton, close to the skin. For this and similar applications filtered beams offer better detectability, i.e., dose to the patient. Dose sparing is also achieved if Cf252 replaces Am-Be and Pu-Be sources. DOE

N83-17063# Oak Ridge National Lab., Tenn. Industrial Safety and Applied Health Physics Div.
THE EFFECTS OF LOW LEVELS OF RADIATION ON HUMANS
John A. Auxier 1981 16 p refs Presented at the 3rd Natl.

Congr. of the Natl. Assoc. of Tech. of Med. Radiology, Panama City, 5 Nov. 1981
(Contract W-7405-eng-26)
(DE82-004108; CONF-811155-1) Avail: NTIS HC A02/MF A01

The state of knowledge on effects of low-level ionizing radiations on humans is reviewed. Several problems relating to dose thresholds or lack of thresholds for several types of cancer and high linear energy transfer (LET) raditions and the effects of fractionation and dose protection are discussed. DOE

N83-17064# Pacific Northwest Lab., Richland, Wash.
IN VIVO MEASUREMENT OF AMERICIUM-241 IN AN ACCIDENTALLY EXPOSED SUBJECT
H. E. Palmer, G. A. Rieksts, and E. E. Icayan (Hanford Environmental Health Foundation) Oct. 1981 38 p refs Presented at the Intern. Meeting on the Radiobiol. of Radium and Actinides in Man, Lake Geneva, Wis., 12 Oct. 1981
(Contract DE-AC06-76RL-01830)
(DE82-004319; PNL-SA-7471; CONF-8110126-1) Avail: NTIS HC A03/MF A01

Detailed external measurements were made of internally deposited Am241 in a nuclear chemical operator involved in an americium exposure accident at the Hanford plant. Despite some interference from high-level external contamination, quantitative measurements of the Am241 content in the lung, liver, and bones were made starting on the third day after the accident. The rate of excretion of AM241 from these organs was determined. The Am241 embedded in the skin of the face and head was carefully mapped. The distribution over the total length of the body was also determined. Linear and rectilinear scanners, gamma cameras, large and small scintillation detectors, proportional counters, and Si(Li) and intrinsic germanium detectors were used to evaluate the internal deposition. Methods of calibration for quantitative measurement included simulation of the Am241 activity in both phantom and cadaver parts. DOE

N83-17065# Oak Ridge National Lab., Tenn. Health and Safety Div.
NUCLEAR MEDICINE TECHNOLOGY Progress Report, quarter ending 30 Jun. 1981
F. F. Knapp, Jr. Dec. 1981 25 p refs
(Contract W-7405-eng-26)
(DE82-005997; ORNL/TM-7918) Avail: NTIS HC A02/MF A01

The production of 191Os for 191Os-/sup 191m/Ir generator by irradiation of natural osmium was assessed because of limited supplies of enriched 190Os. The distribution of radionuclide products was determined after a 14 day irradiation of natural osmium in the High Flux Isotope Reactor (HFIR) to evaluate the potential usefulness of this method of 191Os production in comparison to irradiation of 97.8% enriched 191Os. It is indicated that neutron irradiation of natural osmium is impractical for production of 191Os for clinical use and that irradiation of enriched 1900s is the preferred production mode. A new tellurium fatty acid was prepared and evaluated in rats in which radioiodine (131I) was chemically stabilized on the molecule as a vinyl iodide. The absolute heart uptake was only marginal, however, which suggest that this particular vinyl iodide telluride fatty acid does not show high heart specificity. DOE

N83-17066# Oak Ridge National Lab., Tenn. Chemical Effects Information Center.
CHEMICALS IN IDENTIFIED HUMAN BIOLOGICAL MEDIA: A DATA BASE Annual Report
M. V. Cone, comp., M. F. Baldauf, comp., and F. M. Martin, comp. Oct. 1981 513 p refs
(Contract W-7405-eng-26)
(DE82-007120; ORNL/EIS-163-Vol-1-Pt-2; EPA-560/5-81-008A-Vol-3-Pt-2; AR-3) Avail: NTIS HC A22/MF A01

The data base in tabular format is provided. There are two sections, the first with records on nondrug substances, and the second with records on drugs. Chemicals in each section are arranged alphabetically by CAS preferred name, CAS registry number, formula, atomic weight, melting point, boiling point, and vapor pressure. Tissues are listed alphabetically with exposure route, analytical method, number of cases, range, and mean, when available in the source document. A variety of information may also be included that is pertinent to the range and mean as well as experimental design, demography, health effects, pathology, morphology, and toxicity. Review articles are included in the data base; however, no data have been extracted from such documents because the original research articles are included. DOE

N83-17067# Oak Ridge National Lab., Tenn.
DEVELOPMENT OF STATISTICAL DATABASES FOR TOXICOLOGICAL STUDIES
Karen L. Daniels and Jonathan Goyert 1981 23 p refs Presented at the Workshop on Statist. Databases for Toxicol. Studies, Menlo Park, Calif., 2 Dec. 1981
(Contract W-7405-eng-26)
(DE82-005196; CONF-811208-3) Avail: NTIS HC A02/MF A01

Methods for assessing the effects of coal derived synthetic fuels on the aquatic environment are discussed. An approach is presented that was used to develop and implement a statistical data base for analyzing these effects. Fifty-four separate acute bioassay tests were conducted by six investigators using nine species, six compounds, and multiple exposure concentrations/compound with three to five replicates per exposure concentration/compound. Organisms from each species were exposed to several concentrations of each compound and a response was noted. The Statistical Analysis System (SAS) software package running under IBM's Virtual System in a time share option environment was used from data base management, statistical analysis, and graphical display. Partitioned raw data files, SAS program files, and SAS data bases were used to maintain the integrity of each investigator's data and to allow for ready access to all data. DOE

N83-17068# Technische Hogeschool, Eindhoven (Netherlands). Medical Electrical Engineering Group.
DIRECT MEASUREMENT OF BLOOD PRESSURE BY LIQUID-FILLED CATHETER MANOMETER SYSTEMS
J. L. C. Plasman and C. M. M. Timmers Jul. 1981 51 p refs
(EUT-81-E-121; ISBN-90-6144-121-8) Avail: NTIS HC A04/MF A01

The reproduction of the blood pressure waveform when catheter-manometer systems are used is discussed. It is shown that a hydraulic system with short, stiff and wide bore (1.8 mm) lines which contain no, or hardly any, air bubbles and have a minimum of connections should be used. It is also shown that the amplitude versus frequency characteristic and the phase versus frequency characteristic of hydraulic systems with relatively low undamped resonant frequency (40 Hz) and low damping ratio (0.15) can be markedly improved by using electrical filtering techniques. Author (ESA)

N83-17069# Research Inst. of National Defence, Stockholm (Sweden).
THERMAL EFFECTS OF HEAT AND MICROWAVE ON RATS [TERMISKA EFFEKTER AV VAERME - OCH MIKROVAAGOR PAA RAATTA]
Olle Criborn, Carl-Johan Clemedson, and Christina Henriksson Jul. 1982 21 p refs In SWEDISH
(FOA-C-54042-H1) Avail: NTIS HC A02/MF A01

Radiation tests on rats, inside a thermal zone with 2450 MHz microwaves, showed a momentary mental reaction which probably was not directly a result of the temperature elevation. Microwaves induced 10 times higher thermal effects than a heat radiation lamp of a corresponding intensity, the radiation intensity being determined from the temperature elevation values of water in a plastic container. In anesthetized rats the body temperature increase is two times higher than in controls, both under heat or microwave radiation. No obvious temperature rise in the brain, compared with the body temperature, was observed. Anesthetized and nonanesthetized animals show an acceleration of the respiratory rate as the body temperature increases. At microwave

intensites over 30 mW/sqcm the rats could not smooth away the induced thermal effects and the body temperature rose.
Author (ESA)

N83-17070# Research Inst. of National Defence, Stockholm (Sweden).
ANTHROPOMETRIC MEASUREMENTS FORECAST ON SWEDISH PILOTS IN THE YEAR 2001 [PROGNOS FOER ANTROPOMETRISKA MAATT HOS SVENSKA FLYGFOERARE AAR 2001]
Thord Levin and Ove Wilson Apr. 1982 192 p refs In SWEDISH
(FOA-C-59004-H2) Avail: NTIS HC A09/MF A01

Body height increase of Swedish men and changes in body dimensions of applicants for aircraft pilot training are reported; body height, weight, and dimensions in sitting position of pilot candidates and of regular pilots are compared with the measurements of other inductees and draftees of the same age. Maximum and minimum values for body height were selected as a limiting variable, and height in the sitting position as the decision variable. The selected values were studied on applicants for pilot training and the exclusion of candidates was analyzed. Forecasting on other body dimensions was also carried out. Threshold values for the body dimensions of future pilot candidates are presented. Available room in the aircraft and admittance stipulations are considered. Author (ESA)

N83-17071# Maryland Univ., Baltimore. Div. of Pulmonary Diseases.
PULMONARY FUNCTION AND BRONCHIAL REACTIVITY IN HUMAN SUBJECTS WITH EXPOSURE TO OZONE AND RESPIRABLE SULFURIC ACID AEROSOL. AN ENVIRONMENTAL CHAMBER STUDY Final Report, Nov. 1976 - Jun. 1980
Thomas J. Kulle, H. David Kerr, Bernard P. Farrell, Larry R. Sauder, and David L. Swift Jul. 1982 44 p refs Prepared in cooperation with Johns Hopkins University, Baltimore
(Grant EPA-R-803804)
(PB82-255126; EPA/600/1-82-012) Avail: NTIS HC A03/MF A01 CSCL 06T

A three-year research study was conducted investigating the effects of individual and sequential exposures to ozone and sulfuric acid aerosol on pulmonary function and bronchial reactivity in human subjects. In healthly smokers and nonsmokers exposed for 4 hours to 98 micrograms/cu. m 01.4 micrometers H2SO4 aerosol, no significant changes in pulmonary function were observed with exposure or 24 hours post-exposure. The effect of 0.3 ppm O3 on a subsequent exposure to 100 micrograms/cu. m, 0.13 micrometers H2SO4 aerosol was studied in nonsmoking subjects to determine if pre-exposure to O3 would sensitize these individuals to H2SO4 aerosol. Author (GRA)

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N83-17072# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
THE MEASUREMENT OF PILOT WORKLOAD Interim Report
Earl S. Stein and Bruce L. Rosenberg Jan. 1983 54 p refs
(FAA Proj. 161-301-150)
(DOT/FAA/EM-81/14; DOT/FAA/CT-82/23) Avail: NTIS HC A04/MF A01

Workload during flight simulation, using two primary variables: the pilots' own evaluation sampled one per minute with a computer and the latency or delay of that response was measured. This was supplemented by a postflight questionnaire. Three levels of flight difficulty were established by subject matter experts. These were varied by controlling (1) initial clearance complexity, (2) level of air traffic control, (3) turbulence, and (4) inflight emergency. Flights were conducted in a General Aviation Instrument trainer and 12 pilots participated. Results demonstrated that pilots were willing and able to make inflight workload evaluations which corresponded directly with the induced difficulty level. Response latencies increased in relationship to difficulty, but the intermediate and most difficult flights were not significantly different. Author

N83-17073# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TO GROW WINGS IN THEIR YOUTH
Yu. Zelvenskiy 26 Aug. 1982 14 p Transl. into ENGLISH from Krylya Rodiny (USSR), no. 7, Jul. 1966 p 9-11
(AD-A120593; FTD-ID(RS)T-1099-82) Avail: NTIS HC A02/MF A01 CSCL 05/9

Indoctrination of cosmonaut and pilot trainees is addressed.
Author

N83-17074# Army Aeromedical Research Lab., Fort Rucker, Ala. Biomedical Applications Research Div.
COMPARISON OF HELICOPTER COPILOT WORKLOAD WHILE USING THREE NAVIGATION SYSTEMS DURING NAP-OF-THE-EARTH FLIGHT Final Report
David O. Cote, Ronald R. Simmons, and Gerald P. Krueger Aug. 1982 113 p refs Presented at the 37th Ann. Forum of the Am. Helicopter Soc. Document previously announced as A81-46616
(DA Proj. 3E1-62777-A-879)
(AD-A120501; USAARL-82-8) Avail: NTIS HC A06/MF A01 CSCL 05/5

Three different generic navigation systems were examined for their effects on helicopter copilot/navigator workload and performance during nap-of-the-earth (NOE) flight. The navigation systems examined were: (1) the conventional 1:50,000 scale topographic hand-held map, (2) a Doppler navigation system in conjunction with a hand-held map, and (3) a projected map system driven by Doppler signals in conjunction with a hand-held map. Eighteen pilots performed copilot/navigator duties in an Army JUH-1H utility helicopter flown by a laboratory research pilot. Data collected included measures of navigation performance, pilot-copilot communications, and copilot/navigator eye movements. The results indicate that automatic navigation systems like the ones used here improve navigation performance by enabling the aircrew to reach their destination with reduced in-flight delays, at a faster airspeed, and with fewer and smaller navigation errors. The number of verbal exchanges between the copilot and pilot was reduced when using the Doppler system versus the hand-held map alone. Subjects who used the Doppler also spent less time navigating. When using a projected map system, copilot/navigators experienced a lower level of visual workload and spent 10% more time looking outside the cockpit. GRA

N83-17075# Illinois Univ., Champaign. Human Attention Research Lab.
ATTENTION THEORY AND MECHANISMS FOR SKILLED PERFORMANCES
Walter Schneider and Arthur D. Fisk Jul. 1982 21 p refs
(Contract N00014-81-K-0034; NR Proj. 154-460)
(AD-A119699; HARL-ONR-8201) Avail: NTIS HC A02/MF A01 CSCL 05/10

Current attentional research and theory are related to the development of skilled performance. Emphasis is given to how performance changes with practice. Dual process attention theory is reviewed examining the distinction between automatic and controlled processing. The changing interactions between automatic and controlled processing in the development of skill are discussed. It is proposed that consistent practice produces automatic productions which perform consistent transformations in a heterarchial system. Automatic productions are proposed to: be modular; show high transfer; become resource free; not be under direct control; and be fast, accurate, and coordinated. Controlled processing is assumed to develop automatic processing, maintain strategy and time varying information, and perform problem solving activities. Perceptual data, some motor data, and several motor performance examples are presented to illustrate

automatic/controlled processing effects. The relationship to current theories of motor skill are discussed. New research paradigms suggested by the current approach are discussed. Author (GRA)

N83-17076# Illinois Univ., Champaign. Human Attention Research Lab.

PROCESSING WITH AND WITHOUT LONG-TERM MEMORY MODIFICATION: ATTENTION, LEVEL OF PROCESSING AND WORD FREQUENCY

Walter Schneider and Arthur D. Fisk Jul. 1982 26 p refs
(Contract N00014-81-K-0034; NR Proj. 154-460)
(AD-A119520; HARL-ONR-8203) Avail: NTIS HC A03/MF A01 CSCL 05/10

In this research we examine the relationships among long-term memory (LTM) modification, attentional allocation and type of processing. The experiments test the proposal from automatic/controlled processing theory (Schneider and Shiffrin, 1977) that the modification of LTM occurs only during controlling processing and that stimuli can be automatically processed with no resulting LTM effect. Subjects in the first experiment were exposed to words while performing an intentional learning task; a semantic categorization task; a graphic categorization task; a distracting digit search task while trying to remember presented words; or a distracting task while trying to ignore the simultaneous words. In the distracting digit search conditions frequency judgments of words were at or near chance. Distractor learning for the semantic and intentional conditions was better than for graphic orienting, which was better than chance. In the second experiment, subjects were trained for approximately 5,000 trials to develop an automatic categorization response. The results showed no evidence of a frequency estimation ability and little recognition memory for words semantically categorized twenty times. The data support the hypothesis of a close connection between controlled processing and LTM storage and little if any link between automatic processing and LTM storage. GRA

N83-17077# Illinois Univ., Champaign. Human Attention Research Lab.

AUTOMATIC CATEGORY SEARCH AND ITS TRANSFER: AUTOMATED PROCESS SEMANTIC FILTERING

Walter Schneider and Arthur D. Fisk Jul. 1982 27 p refs
(Contract N00014-81-K-0034)
(AD-A119519; HARL-ONR-8202) Avail: NTIS HC A03/MF A01 CSCL 05/9

When subjects receive extended practice searching for words from a consistently mapped (CM) category, search becomes substantially faster, more accurate, and less effortful. The present experiments examine the extent to which category search practice effects are semantically based. Experiment 1a examined improvements in reaction time in detecting words from a category as a function of the number of exemplars (4-12) in the category. All conditions showed improvement, but there was no effect of the number of exemplars. Experiment 1b examined the extent to which training on a subset of exemplars transferred to untrained members of the category. Results showed substantial positive transfer (60 to 92%) to untrained exemplars from the trained category and the transfer was better if there were more exemplars in the training set. Experiment 2a replicated previous results showing that practice reduces resource sensitivity in consistently mapped (CM) category search but does not benefit variably mapped (VM) category search. Experiment 2b examined whether untrained exemplars of a CM trained category would be detected on first presentation when subjects were engaged in a high workload VM digit search task. Untrained exemplars of the CM category were detected on first presentation showing substantial positive transfer (70%). GRA

N83-17078# Kansas State Univ., Manhattan. Inst. for Environmental Research.

DECISION MAKING UNDER HIGH THERMAL STRESS: AN ANNOTATED BIBLIOGRAPHY ON ENVIRONMENTAL STRESSORS AND BEHAVIOR Report, Sep. 1981 - Aug. 1982

Frederick H. Rohles, Jr., Stephan A. Konz, and Rachel J. Krohn Aug. 1982 78 p
(AD-A119136; Rept-1; LPN-FEMA-1131B) Avail: NTIS HC A05/MF A01 CSCL 06/19

This research will study the effects of exposure to the stressors of a simulated survival shelter on decision making. A proposed 5 year effort is summarized that involves a literature search, the development of a test battery to assess the decision making skill, tests in simulated shelters, and the development of strategies to assist in the decision making process. Corollary efforts involve the use of the bicycle ventilating device for charging nickel-cadmium dry cell batteries and relationship between shelter occupant density and shelter occupant numbers. This, the first report of the project, contains an annotated bibliography of the research on the effects upon behavior, of the stressors of temperature, crowding, sleep disturbances, panic, stress, and anxiety. In addition, a survey was conducted which identified 93 problem areas for the survival shelter occupant. These fell equally into three main categories: survival shelter, personal, and environment. GRA

N83-17079# Arizona State Univ., Tempe.

PLANS, CONFIDENCE AND PERFORMANCE: AN ELABORATION OF SELF-EFFICACY THEORY Ph.D. Thesis

Karl O. Moe May 1982 116 p refs
(AD-A119091; AFIT-CI-NR-82-40D) Avail: NTIS HC A06/MF A01 CSCL 05/10

Self-efficacy theory states that performance is best predicted by carefully assessing an individual's self-efficacy expectations. Self-efficacy expectations are the output of a central processor of relevant information. This paper reports the results of two studies which evaluated the possibility of a person's plans for performing a specific behavior having a direct, unmediated effect on performance. One study used dominating a ten minute conversation as the experimental task. For this study, 70 male and 82 female undergraduate students were the subjects. These subjects wrote out plans for dominating a conversation, indicated their satisfaction with their plans, and recorded their self-efficacy expectations for actually dominating the conversation. The subjects for the other study were 107 students in a school for training court reporters. They wrote out plans for taking down and transcribing question and answer testimony. Results of additional analyses suggest that the quality of a person's plan for performance may be helpful in explaining discrepancies between expected and actual performance. GRA

N83-17080# University of West Florida, Pensacola. Dept. of Psychology.

FACTORS INFLUENCING HEMISPHERIC SPECIALIZATION M.S. Thesis

Brenda Joyce Royster May 1982 39 p refs
(AD-A118978; AFIT-CI-NR-82-82-47T) Avail: NTIS HC A03/MF A01 CSCL 05/10

To determine whether hemispheric specialization for visuopatial functions occurs as predicted from existing models of cerebral lateralization processes, 16 participants were bilaterally presented face stimuli using a tachistoscope. Both familiar and unfamiliar faces were utilized with a memory and nonmemory condition for each. Subjects made judgements of 'same' when faces were identical to each other and 'different' when faces were of different persons. As predicted, the reaction times to the unfamiliar memorized faces were significantly faster when the stimuli were presented to the left visual field/right hemisphere. Reaction times to the unfamiliar faces also showed a left visual field/right hemisphere advantage for judgements of different but not for judgements of same. No visual-field differences were found using familiar stimuli for either memory condition or judgement type, indicating that different processes may underlie the analysis of the two stimulus types in addition to the two judgement types. GRA

N83-17081# Naval Training Analysis and Evaluation Group, Orlando, Fla.

AN ASSESSMENT OF THE TRAINING EFFECTIVENESS OF DEVICE 2F64C FOR TRAINING HELICOPTER REPLACEMENT PILOTS

Robert F. Browning, William C. McDaniel, Paul G. Scott, and Alfred F. Smode Jul. 1982 155 p
(AD-A118942; TAEG-TR-127) Avail: NTIS HC A08/MF A01 CSCL 05/9

The effectiveness of flight simulators is heavily dependent on simulator utilization practices. This report presents the first of four planned assessments of the training effectiveness of Device 2F64C in training fleet replacement SH-3 helicopter pilots. GRA

N83-17082# Oregon Univ., Eugene. Dept. of Psychology.
EXPLORATIONS OF INDIVIDUAL DIFFERENCES RELEVANT TO HIGH LEVEL SKILL Final Report
Steven W. Keele and Harold L. Hawkins 15 Dec. 1981 39 p refs
(Contract N00014-77-C-0643; NR Proj. 150-407)
(AD-A120152; TR-7) Avail: NTIS HC A03/MF A01 CSCL 05/10

Past research has uncovered few broad abilities that underlie high level motor skill. In this paper attempts to isolate three different abilities of potential relevance to skill are described. No evidence was found for a general time-sharing ability in common to different kinds of tasks. Modest evidence was found for a trait of attentional flexibility. That trait could potentially be of use in predicting success on skills that require rapid shifts of attention because of rapidly changing task demands. Finally, the rate of repetitive activity is correlated across different muscle groups. For example, finger tapping speed is correlated with foot tapping speed, suggesting a common rate limiting factor. In turn, those rates predict handwriting speed and, according to Book (1924) championship typing speed. GRA

N83-17083# Seville Research Corp., Pensacola, Fla.
PHASE 1 PILOT STUDY: VTRS TRANSFER OF TRAINING EXPERIMENT Final Report, May 1981 - Mar. 1982
Robert N. Insley and William D. Spears Mar. 1982 55 p
(Contract N61339-80-D-0009)
(AD-A120315; S-TR-82-03; NAVTRAEQUIPC-80-D-0009-17-2) Avail: NTIS HC A04/MF A01 CSCL 05/10

This report describes a pilot study undertaken during the first phase of a research effort designed to assess the training effectiveness of visual display system variables for aircraft carrier qualification training in the Navy jet undergraduate pilot training program. The purpose of the pilot study is to develop information useful to the development of a recommended exprimental design for a full scale transfer of training experiment using the Navy's visual technology research simulator and the T-2 aircraft. Feasibility concerns related to: (1) simulator variables; (2) performance assessment; and (3) logistic and administrative problems are addressed. Seven student naval aviators participated in the study. Study results supported other first phase findings that conduct of a full scale transfer of training study is feasible. Author (GRA)

N83-17084# Research Inst. of National Defence, Stockholm (Sweden).
LONG RANGE IDENTIFICATION OF SILHOUETTE TARGETS, GIVEN DIFFERENT NUMBERS OF ALTERNATIVE RESPONSES, AND VARYING TARGET SIMILARITY [IDENTIFIERING AV SILUETTMAAL PAA LAANGA AVSTAAND VID VARIERANDE ANTAL SVARSALTERNATIV OCH VARIERANDE LIKHET MELLEN MAALEN]
Bjoern Modeer Aug. 1982 15 p refs In SWEDISH
(FOA-C-53009-H2) Avail: NTIS HC A02/MF A01

Long range identification of two, three or four different vehicles was studied using slide projections with high contrast. Subjects viewed 6 x 80 silhouette pictures at scaled ranges from 4700 to 5800 m. Results show that the number of target alternatives and the similarity among them greatly influence performance. Silhouettes are less accurately identified when the number of alternatives is high, especially for long ranges. A high number of alternatives also increases attribution of vehicle similarity, causing most of the wrong answers at the shorter range. At the long range identification errors are due to the increase in target similarity, and an increase in the number of targets. Author (ESA)

N83-17085# Research Inst. of National Defence, Stockholm (Sweden).
LONG RANGE TARGET IDENTIFICATION OF VEHICULAR SILHOUETTES
Bjoern Modeer Aug. 1982 15 p refs Revised
(FOA-C-53007-H2; FOA-C-56019-H6) Avail: NTIS HC A02/MF A01

Long range identification of five vehicles was studied in a laboratory experiment. Silhouette pictures, with high contrast, were viewed at scaled ranges from 3000 to 7200 m. Subjects made 160 observations each. For all vehicles the mean rate of correct identifications was over 50 % up to 5000 m. At longer ranges the differences in performance between the vehicles increase and there is a significant interaction between vehicle and range. At ranges over 5000 m there is a clear tendency to underestimate the target size. It is concluded that the composition of the target array is of great importance for the identification performance. Methodological implications of this are discussed. Author (ESA)

N83-17086# Institut de Recherche des Transports, Arcueil (France). Centre d'Evaluation et de Recherche des Nuisances et de l'Energie.
INFLUENCE OF DRIVER BEHAVIOR ON FUEL CONSUMPTION: BIBLIOGRAPHIC STUDY
Guy Labiale May 1982 80 p refs In FRENCH; ENGLISH summary
(IRT-58; ISBN-2-85782-094-1; ISSN-0150-8997) Avail: NTIS HC A05/MF A01

The literature on the effect of different types of driving upon the parameters of mechanical vehicle use and upon fuel consumption, and on the efficiency of indicators and aids to vehicle driving as regards fuel consumption, was studied. The differences in fuel consumption between drivers are between 8 % and 10 %, but can reach 50 % between the extreme consumption levels. The difference of the fuel consumption of the same driver related to different motivations is between 8 % and 23 % but can reach 25 % between the extreme consumption levels. These variabilities of fuel consumption are related to vehicle use parameters such as acceleration, variability of acceleration, normal running of engine, and speed. Research which stresses the analysis of driver behavior and driving strategies, as well as the interaction of the road-vehicle-driver system in order to state fuel consumption and determine economical driving models, is proposed. Author (ESA)

N83-16362# Joint Publications Research Service, Arlington, Va.
PAST AND PRESENT OF COSMONAUT TRAINING CENTER
In its USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 29-34 Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 4, Apr. 1982 p 40-43 (For primary document see N83-16360 07-12)
Copyright. Avail: NTIS HC A08/MF A01

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N83-17087*# Stanford Research Inst., Menlo Park, Calif.
DEVELOPMENT OF A PROTOTYPE AUTOMATIC CONTROLLER FOR LIQUID COOLING GARMENT INLET TEMPERATURE Final Report
C. S. Weaver, B. W. Webbon, and L. D. Montgomery Oct. 1982 91 p refs
(Contract NAS9-16487; SRI Proj. 3733)
(NASA-CR-167782; NAS 1.26:167782) Avail: NTIS HC A05/MF A01 CSCL 06K

The development of a computer control of a liquid cooled garment (LCG) inlet temperature is descirbed. An adaptive model of the LCG is used to predict the heat-removal rates for various inlet temperatures. An experimental system that contains a

microcomputer was constructed. The LCG inlet and outlet temperatures and the heat exchanger outlet temperature form the inputs to the computer. The adaptive model prediction method of control is successful during tests where the inlet temperature is automatically chosen by the computer. It is concluded that the program can be implemented in a microprocessor of a size that is practical for a life support back-pack. E.A.K.

N83-17088*# North Carolina State Univ., Raleigh. Dept. of Soil Science.
PLANT GROWTH IN CONTROLLED ENVIRONMENTS IN RESPONSE TO CHARACTERISTICS OF NUTRIENT SOLUTIONS
C. David Raper, Jr. Nov. 1982 103 p refs
(Contract NCC2-101)
(NASA-CR-166431; NAS 1.26:166431) Avail: NTIS HC A06/MF A01 CSCL 06C

Plant growth in controlled environments in response to characteristics of nutrient solutions is discussed. Descriptions of experimental results concerning root acclimation to temperature, root and shoot acclimation to nitrogen stress, and growth response to NH4(+) and NO3(-) nutrition are included. A preliminary model validation to changing temperatures is presented. Author

N83-17089*# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Aircraft-Vehicle System Interaction.
AIRCRAFT-VEHICLE SYSTEM INTERACTION. AN EVALUATION OF NASA'S PROGRAM IN HUMAN FACTORS RESEARCH
1982 41 p refs
(Contract NASw-3455)
(NASA-CR-169650; NAS 1.26:169650) Avail: NTIS HC A03/MF A01 CSCL 05H

Research in the areas of man machine interaction and human factors engineering are assessed in relation to improved effeciency and aviation safety. The appropriateness, relevance, adequacy, and timeliness of the research is evaluated, and recommendations are provided regarding the objectives, approach and content. S.L.

N83-17090# Illinois Univ., Urbana. Coordinated Science Lab.
AN EXPERT DISTRIBUTED ROBOTICS SYSTEM WITH COMPREHENSION AND LEARNING ABILITIES IN THE AIRCRAFT FLIGHT DOMAIN Semiannual Technical Report, 1 Jan. - 30 Jun. 1982
David L. Waltz, R. T. Chien, and Gerald F. DeJong Jul. 1982 68 p refs
(Contract F49620-82-K-0009; AF Proj. 2304)
(AD-A120184; T-116; AFOSR-82-0879TR) Avail: NTIS HC A04/MF A01 CSCL 09/2

The authors are focusing on in-flight problem diagnosis. Suppose, for example, a pilot simultaneously experiences overheating in one engine and aileron reverse. He might attribute the problem to the hydraulic system, but unless he possessed detailed technical knowledge of the particular aircraft, he might not be able to decide which sub-assembly component became disfunctional. However, exactly how and where the problem occurred may have implications for how to deal with it. Indeed, a naively plausible, but wrong, assessment of the problem may lead the pilot to exacerbate rather than improve his situation. On-board intelligent computer system to aid in diagnosis and to suggest corrective measures would be of great help. There are a number of essential attributes of such a system. Such a system raises a number of theoretically important issues of interest to the investigators. Very broadly, the issues are: (1) developing computer representations for physical mechanisms, (2) intelligent modeling of those mechanisms, (3) high level natural language communication between humans and computers, and (4) learning from experience and instruction. The remainder of this report is divided into three sections. Each describes the progress reported by one investigator. Several sections contribute to more than one of the four facets of the in-flight diagnosis problem (representation, mechanism modeling, natural language, and learning). GRA

N83-17091# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biomechanical Protection Branch.
EVALUATION OF THE INFLUENCE OF UPPER EXTREMITY BRACING TECHNIQUES ON HUMAN RESPONSE DURING VERTICAL IMPACT
Bernard F. Hearon, James W. Brinkley, James H. Raddin, Jr., Lawrence A. McGowan, and Joseph M. Powers Aug. 1982 225 p refs
(AF Proj. 7231)
(AD-A120250; AFAMRL-TR-82-54) Avail: NTIS HC A10/MF A01 CSCL 06/7

A test program was conducted to evaluate the effectiveness of upper extremity bracing techniques during +G sub z impact acceleration. Fifty human impact tests were performed on the Vertical Deceleration Tower up to an impact level of 10.5 G mean (std dev = 0.23), 26 ft/sec velocity change. Subjects were restrained in the operational F-FB-111 crew seat and restraint system and were exposed to comparable impacts in different bracing conditions (including the currently recommended crossed-arms position and a proposed, alternate hands-on-knees position) to allow parametric analysis of the test results. Measured data included seat acceleration and velocity, head and chest translational acceleration components, triaxial forces acting on the seat and footrest, forces acting at the restraint harness attachments, and displacements of various body segments. Six of eighteen subjects physically could not perform the crossed-arms brace and thus could not be tested in that position. For the subjects tested in both conditions, seat pan loads were significantly less in the hands-on-knees position than in the crossed-arms position. There was no significant difference in maximum head displacement in the two conditions. On the basis of these findings, it is recommended that the hands-on-knees position be used by F/FB-111 ejectees preparing for landing impact of the crew module. It appears that this technique may be utilized by all crewmembers and may afford them greater impact protection than the currently recommended procedure. GRA

N83-17092# Pennsylvania State Univ., University Park. Biomechanics Lab.
EFFECTS OF GENDER, LOAD, AND BACKPACK ON THE TEMPORAL AND KINEMATIC CHARACTERISTICS OF WALKING GAIT, VOLUME 3 Final Report, 1 Oct. 1979 - 21 Aug. 1981
Philip E. Martin and Richard C. Nelson Natick, Mass. Army Natick Labs. Apr. 1982 81 p refs
(Contract DAAK60-79-C-0131; DA Proj. 1L1-62723-AH-98)
(AD-A120101; NATICK-TR-82/021-Vol-3) Avail: NTIS HC A05/MF A01

This study was conducted to determine the effects of loads worn or carried and the type of backpack used on parameters of the walking gait of men and women. Eleven men and eleven women participated in the test, with walking speed controlled at 4 mi/hr, under each of the following load conditions: Load 1 - baseline (shorts, t-shirt, sneakers); Load 2-fighting gear (utility shirt and trousers, boots, ALICE fighting gear); Load 3-combat gear (Load 2 plus PASGT helmet, PASGT armor vest, simulated M16 rifle); Load 4-combat gear and 20-1b backpack load (Load 3 plus backpack with 20-lb load); Load 5 - combat gear and 35-lb backpack load (Load 4 plus an additional 15 lb in pack). The men were also tested under a sixth load condition: Load 6 combat gear and 50-lb backpack load (Load 4 plus an additional 30 lb in pack). The subjects carried loads 4 through 6 using four different backpack systems. Two of these consisted of Army frames equipped with the standard Army pack. The third was an experimental item, a packboard made of rigid aluminum, used with the Army pack. The fourth backpack was a commercially-available, internal frame system. The dependent measures analyzed were stride length, rate, and velocity, single leg contact time, double support time, swing time, and trunk angle. Analyses of the data indicated that there was little difference in the trunk angles maintained by the men and the women. Author (GRA)

N83-17093# California Univ., Livermore. Lawrence Livermore Lab.
SERVICE LIFE OF RESPIRATOR CARTRIDGES FOR FORMALDEHYDE
G. O. Nelson, G. J. Carlson, and J. S. Johnson 20 Nov. 1981 8 p refs
(Contract W-7405-eng-48)
(DE82-005111; UCID-19155) Avail: NTIS HC A02/MF A01

To date there is no NIOSH approved air purifying respirator which will effectively remove formaldehyde gas. Because of formaldehyde's high vapor pressure, service life values calculated using the adsorption isotherm and Wheeler equations indicate that organic vapor cartridges containing activated carbon will last less than 10 minutes at concentrations greater than 10 ppM. Studies were initiated to identify a suitable sorbent for this potentially dangerous material. The project involves the following steps: develop a method for producing relatively high concentrations (20 ppM) of a formaldehyde test mixture; verify this test concentration using the NIOSH approved chromotropic acid wet chemical technique; and survey a wide variety of sorbents, both plain and impregnated, in hopes of identifying a suitable air purifying cartridge for formaldehyde. A dynamic formaldehyde generation system was fabricated in which formaldehyde was produced by continuously injecting formalin using a syringe pump. DOE

N83-17094# Research Inst. of National Defence, Stockholm (Sweden).
THE KNOWLEDGE TRANSFER IN BIOTECHNOLOGY: SOME RESULTS OF A SURVEY [BIOTEKNOLOGINS KUNSKAPSOEVERFOERING, NAEGRA RESULTAT AV EN ENKAET]
Hans Furustig Feb. 1982 16 p refs In SWEDISH
(FOA-C-56030-H2) Avail: NTIS HC A02/MF A01

Users views on problems related to biotechnological informative transmission were reviewed. The evaluation of these indications by ergonomics specialists with regard to documentation, contact activity, systems analysis, ergonomic systems and human factors engineering is discussed. Author (ESA)

N83-17095# Research Inst. of National Defence, Umea (Sweden).
THE USE OF COMPRESSED AIR SYSTEMS IN RELATION TO COMPRESSED AIR MASKS; INVESTIGATION OF DIFFERENT INDUSTRIES [TRYCKLUFTSNAETS LAEMPLIGHET TILL TRYCKLUFTSMASKER. UNDERSOEKNING VID OLIKA INDUSTRIER]
Roger Sunqvist Feb. 1982 18 p refs In SWEDISH
(FOA-A-40038-C2) Avail: NTIS HC A02/MF A01

Tests were undertaken in 25 industries for evaluating to what extent the air from compressed air systems was suitable for breathing equipment. Oil mist, in the gas and in the aerosol phase, carbon monoxide content, and humidity were determined and the efficiency of different filters was investigated. Oil-free compressors supplied good breathing air, but air from oil lubricated compressors showed important differences. In most of compressed air systems the oil mist content in the air was lower than the safety threshold value. Several filters polluted the air with oil mist. No carbon monoxide was found. The installation of the suction inlet of the compressors must be taken into account when the air is used for breathing. Author (ESA)

N83-17096# Research Inst. of National Defence, Stockholm (Sweden).
THE ROLE OF BIOTECHNOLOGY IN TECHNICAL SYSTEMS DEVELOPMENT: SOME EXPERIENCES [BIOTEKNOLOGINS ROLL VID TEKNISK SYSTEMUTVECKLUNG: NAEGRA ERFARENHETER]
Hans Furustig Sep. 1982 66 p refs In SWEDISH
(FOA-C-56032-H2) Avail: NTIS HC A04/MF A01

Literature on the influence of human factors in technical systems development was reviewed. Success and failure in implementing changes in job design, man machine systems, military experience, trade studies, civil experience, and social factors are discussed. Lack of knowledge or inadequate knowledge transfer in biotechnological systems development leads to difficulties in personnel training and can cause safety, layout, and utilization problems. Author (ESA)

N83-17394*# Alabama Univ., Huntsville. Dept. of Psychology.
AUTONOMOUS ONBOARD CREW OPERATIONS: A REVIEW AND DEVELOPMENTAL APPROACH
Jon G. Rogers *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 29 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 05H

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N83-17097*# Bendix Corp., Teterboro, N. J. Flight Systems Div.
MEASUREMENT OF FAULT LATENCY IN A DIGITAL AVIONIC MINI PROCESSOR, PART 2 Progress Report
John G. McGough and Fred Swern Jan. 1983 95 p refs
(Contract NAS1-15946)
(NASA-CR-3651; NAS 1.26:3651) Avail: NTIS HC A05/MF A01 CSCL 09B

The results of fault injection experiments utilizing a gate-level emulation of the central processor unit of the Bendix BDX-930 digital computer are described. Several earlier programs were reprogrammed, expanding the instruction set to capitalize on the full power of the BDX-930 computer. As a final demonstration of fault coverage an extensive, 3-axis, high performance flght control computation was added. The stages in the development of a CPU self-test program emphasizing the relationship between fault coverage, speed, and quantity of instructions were demonstrated. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N83-17098 National Physical Lab., Teddington (England). Protocol Standards Group.
A SYSTEM FOR TESTING PROTOCOL IMPLEMENTATIONS
D. Rayner, ed. Aug. 1982 27 p refs Sponsored by UK Dept. of Industry's Electronics Avionics Requirement Board
(NPL-DITC-9/82) Copyright. Avail: Issuing Activity

The theoretical basis for the development of suitable testing techniques of protocol implementations produced in conformance with international standards in support of open systems interconnection is described. The philosophy and architecture for assessment of protocol implementation which are presented are applicable to most layers of the reference model. The definitions of the test responder and most of the tests are specific to the service concerned but not the protocol. Even those tests that involve the generation of protocol errors can be defined in terms of a suitable enhanced service, where the enhancement only concerns general categories of error. The only part of the development that has to

be protocol specific is the N-protocol encoder-decoder.
Author (ESA)

N83-17099*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NEW TECHNOLOGIES FOR RADIATION-HARDENING ANALOG TO DIGITAL CONVERTERS
Michael K. Gauthier 31 Dec. 1982 64 p refs Sponsored by NASA
(NASA-CR-169799; JPL-Pub-82-105; NAS 1.26:169799) Avail: NTIS HC A04/MF A01 CSCL 09B

Surveys of available Analog to Digital Converters (ADC) suitable for precision applications showed that none have the proper combination of accuracy and radiation hardness to meet space and/or strategic weapon requirements. A development program which will result in an ADC device which will serve a number of space and strategic applications. Emphasis was placed on approaches that could be integrated onto a single chip within three to five years. Author

N83-17100# Illinois Univ., Urbana. Aeronomy Lab.
MICROCOMPUTER DATA COLLECTION FOR THE METEOR RADAR SYSTEM
M. J. Peterson and S. K. Avery 1 Aug. 1982 133 p refs
(Grant NSF ATM-81-17440)
(Aeronomy-104; UILU-ENG-82-2504; ISSN-0568-0581) Avail: NTIS HC A07/MF A01

A major modification of the Urbana meteor-radar data collection system is described. The new hardware is presented and its effects on the data collection algorithms are explored. The software provided to realize these algorithms is described in detail. Finally, the results of an experimental comparison of the old and new meteor-radar systems are discussed. Author

N83-17101# Naval Postgraduate School, Monterey, Calif. Dept. of Computer Science.
MAINTAINING THE INTEGRITY OF DISTRIBUTED DATABASE M.S. Thesis
Fahad A. Al-Lahaidan Jun. 1982 108 p refs
(AD-A120393) Avail: NTIS HC A06/MF A01 CSCL 09/2

The overall objective for distributed databases is that of sharing of data among several nodes. Increasing the number of users and the size of communication are two factors associated with distributed database systems. These factors, with others such as hardware, software and operations, are major factors which could originate threats to the distributed database integrity. Some discussion about these factors is presented. Maintaining the data integrity has become a critical problem in distributed database fields. The problem requires a clear and precise view; it needs an early determination for meeting user requirements for integrity, since each organization has its own priorities. This thesis examines integrity in general and presents some considerations and strategies to be spaced through different system levels, such as design, management, and operation and communication. The main idea of such approaches is to avoid the threats, or to reduce the risks. Author (GRA)

N83-17102# Maryland Univ., College Park. Dept. of Computer Science.
FORMAL SPECIFICATION AND VERIFICATION OF DISTRIBUTED SYSTEMS
Bo-Shoe Chen and Raymond T. Yeh Jun. 1982 14 p refs
(Contract F49620-80-C-0001; AF Proj. 2304)
(AD-A120204; AFOSR-82-0863TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The authors develop an event-based model to specify formally the behavior (the external view) and the structure (the internal view) of distributed systems. Both control-related and data-related properties of distributed systems are specified using two fundamental relationships among events; the 'happens before' relation, representing time order; and the 'enabling' relation, representing causality. No assumption about the existence of a global clock is made in the specifications. The correctness of a design can be proved before implementation by checking the consistency between the behavior specification and the structure specification of a system. Important properties of concurrent systems such as 'mutual exclusion', 'concurrency', and other 'safety' and 'liveness' properties can be specified and verified. GRA

N83-17103# Texas Univ., Austin. Dept. of Computer Sciences.
A DISTRIBUTED ALGORITHM FOR DETECTING RESOURCE DEADLOCKS IN DISTRIBUTED SYSTEMS
K. M. Chandy and J. Misra Aug. 1982 9 p refs Presented at the ACM SIGACT/SIGOPS Conf. on the Principles of Distributed Computing, Ottawa, Canada, 18-20 Aug. 1982
(Grant AF-AFOSR-0205-81; AF Proj. 2304)
(AD-A120299; AFOSR-82-0846TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

This paper presents a distributed algorithm to detect deadlocks in distributed data bases. Features of this paper are (1) a formal model of the problem is presented, (2) the correctness of the algorithm is proved, i.e., the authors show that all true deadlocks will be detected and deadlocks will not be reported falsely, (3) no assumptions are made other than that messages are received correctly and in order and (4) the algorithm is simple.
Author (GRA)

N83-17104# Electronics Research Lab., Adelaide (Australia).
A MICROPROCESSOR BASED 16 CHANNEL DATALOGGER
P. J. Whitbread Oct. 1981 32 p refs
(AD-A120190; ERL-0219-TR; AR-002-639) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report describes a 16 channel voltage recording instrument designed for use in optical radiometry, but with applications in other fields. The 16 channel datalogger provides a means of connecting a radiometer, consisting of 16 silicon diodes with appropriate filters, to a Hewlett-Packard 97S printing, programmable calculator. On command, the datalogger simultaneously samples and stores the 16 input voltages, and supplies the values and corresponding channel numbers to the calculator, to allow recording using the inbuilt printer. The calculator can be programmed to control how often samples are taken, and it can also perform numerical manipulation of values for calibration or scaling, before printing. The datalogger can display the stored voltages on an inbuilt LED display, and can also display input voltages in real time, while samples are not being taken. Author (GRA)

N83-17105# Stanford Linear Accelerator Center, Calif.
STATUS AND FUTURE OF FASTBUS
R. S. Larsen Oct. 1981 5 p refs Presented at the IEEE Nucl. Sci. Symp., San Francisco, 21-23 Oct. 1981
(Contract DE-AC03-76SF-00515)
(DE82-005075; SLAC-PUB-2832) Avail: NTIS HC A02/MF A01

Developments which are needed to make FASTBUS a viable option for future experiments and control systems are addressed. The basic tools available or under development are discussed.
DOE

N83-17106# Stanford Linear Accelerator Center, Calif.
FASTBUS DEMONSTRATION SYSTEMS
L. Paffrath, B. Bertolucci, S. Deiss, D. Gustavson, T. Holmes, D. Horelick, R. S. Larsen, C. Logg, H. Walz, and E. Barsott (Fermilab) Oct. 1981 4 p refs Presented at the IEEE Nucl. Sci. Symp., San Francisco, 21-23 Oct. 1981 Prepared in cooperation with Illinois Univ., Urbana
(Contract DE-AC03-76SF-00515)
(DE82-005273; SLAC-PUB-2835; CONF-811012-48) Avail: NTIS HC A02/MF A01

A demonstration of basic FASTBUS hardware and test software is provided. The systems include single crate egments, simple computer I/O, a fast sequencer and memory, some simple diagnostic and display devices and a UNIBUS to FASTBUS processor interface. The basic FASTBUS protocols and timing transactions, as well as some of the general initialization software features are discussed. DOE

N83-17107# Stanford Linear Accelerator Center, Calif.
DESIGN OF A FASTBUS PROGRAMMABLE SEQUENCER MODULE AND MEMORY MODULE
B. Bertolucci and D. Horelick Oct. 1981 5 p Presented at the IEEE Symp. on Nucl. Sci., San Francisco, 21-23 Oct. 1981
(Contract DE-AC03-76SF-00515)
(DE82-005079; SLAC-PUB-2826; CONF-811012-42) Avail: NTIS HC A02/MF A01

A programmable sequencer and a memory module were designed and built to demonstrate high speed operation of the FASTBUS, and to study design implications of the FASTBUS specification. Both are implemented in ECL, and illustrate master and slave operation, arbitration circuit design, and logical and geographical addressing considerations. DOE

N83-17108# Oak Ridge National Lab., Tenn. Computer Sciences Dept.
A SHORT COURSE IN THE OPERATION ON INTERACT
M. B. Emmett and W. A. Rhoades Sep. 1982 35 p
(Contract W-7405-eng-26)
(DE83-000376; ORNL/CSD/TM-187) Avail: NTIS HC A03/MF A01

A simple subset of INTERACT that will enable users to use the more important features in a relatively short time is presented. INTERACT is an online computer system for entry, editing, and remote job entry. DOE

N83-17109# Technische Hogeschool, Eindhoven (Netherlands). Div. of Digital Systems.
DESCRIPTION AND IMPLEMENTATION OF A SINGLE BOARD COMPUTER FOR INDUSTRIAL CONTROL
Jan Piecha Jun. 1981 40 p refs
(EUT-81-E-120; ISBN-90-6144-120-X) Avail: NTIS HC A03/MF A01

A single board computer based on the Intel 8085 microprocessor is described. It has 4k bytes uv erasable programmable read-only memory, which can be extended to 8k bytes; 8k bytes of random access memory, two full duplex serial interfaces, parallel interface (48 lines), programmable timers, programmable interrupt controller and keyboard/display controller. The debug monitor program is outlined. Author (ESA)

N83-17110# Kent Univ., Canterbury (England). Computing Lab.
OPERATIONAL EXPERIENCES WITH A CAMBRIDGE RING LOCAL AREA NETWORK IN A UNIVERSITY ENVIRONMENT
E. B. Spratt 1980 27 p refs
(PB82-245499; UKC-COMPUTING-LAB-3) Avail: NTIS HC A03/MF A01 CSCL 09B

The current state of the Kent Ring is described. This is followed by a section which covers the developments over the software tools, software developments and the pilot ring service. A brief description of the Cambridge Ring Local Area Network is given. Author

N83-17111# Kent Univ., Canterbury (England). Computing Lab.
THE KENT SPOOLER FOR UNIX
R. P. A. Collinson 3 Jun. 1982 44 p ref
(PB82-247842; UKC-Computing-Lab-13) Avail: NTIS HC A03/MF A01 CSCL 09B

The implementation details not described in the manual pages for the various programs which comprise the system are covered. Copies of the manual pages and a programmers description of several standard routines which provide support for the system are provided. GRA

N83-17112# General Services Administration, Falls Church, Va. Federal Software Testing Center.
1978 FORTRAN COMPILER VALIDATION SYSTEM VERSION 2.0 USER'S GUIDE
29 Jul. 1982 170 p
(PB82-250903; OSD/FSTC-82/021; GSA/DF-82/003A) Avail: NTIS HC A08/MF A01 CSCL 09B

The user's guide for the Compiler Validation System for the 1978 FORTRAN Standard (American Standard Programming Language FORTRAN, X3.9-1978) is provided. Version 2.0 of the 1978 FORTRAN Compiler Validation System (FCVS) was designed to test the full language as defined in the 1978 FORTRAN Standard (also known as FORTRAN 77). The test cases making up the system are for the most part stand alone programs. They are available on a source program library tape. A special program (written in FORTRAN) is provided which will automate the loading of each of the programs making up the FCVS on the users system, thus facilitating their use by any Federal Agency, private sector user or vendor. Author (GRA)

N83-17360*# Alabama A & M Univ., Huntsville. Dept. of Electrical Engineering Technology.
ELECTRICALLY RECONFIGURABLE LOGIC ARRAY
R. K. Agarwal *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 15 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 09B

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N83-17113 Royal Signals and Radar Establishment, Malvern (England).
MODULAR COMPILATION SYSTEMS FOR HIGH LEVEL PROGRAMMING LANGUAGES
I. F. Currie and N. E. Peeling 1982 11 p refs
(RSRE-3460; BR84596) Avail: Issuing Activity

The experience gained by the different implementations of modular compilation in Algol 68 is discussed. The analysis is made in order to avoid problems that were found implementing Algol 68 and other high level languages, notably Ada. The relative merits of the various modular compilation systems are evaluated. It is argued that the inability to call procedures in modules because there is no way of telling if they alter references nonlocally, may be avoided by implementing functions completely free of side effects by prohibiting the use of reference parameters.
Author (ESA)

N83-17114 National Physical Lab., Teddington (England). Div. of Materials Applications.
AN INTERACTIVE MINICOMPUTER PROGRAM FOR PLATE DESIGN ANALYSIS
A. Woolf Aug. 1982 18 p refs
(NPL-DMA(A)51; ISSN-0143-7313) Copyright. Avail: Issuing Activity

A program which computes deflections and bending moments in rectangular orthotropic plates subject to transverse flexural loading is presented. The plate material is elastic and plate deflections are assumed to be small. The solution method is applicable to plates with simply supported clamped or free edges under uniform pressure and point or line loads. The results are presented as tables and contour plots of the deflections and bending moments over the plate. Author (ESA)

N83-17115*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IPAD: INTEGRATED PROGRAMS FOR AEROSPACE-VEHICLE DESIGN
Sep. 1980 398 p refs Proc. of Symp. held in Denver, 17-19 Sep. 1980 Sponsored in cooperation with Industry Technical Advisory Board
(NASA-CP-2143; L-13916; NAS 1.55:2143) Avail: NTIS HC A17/MF A01 CSCL 09B

The conference was organized to promote wider awareness of the IPAD program and its coming impact on American industry. The program focuses on technology issues that are critical to computer aided design manufacturing. Included is a description of

a representative aerospace design process and its interface with manufacturing, the design of a future IPAD integrated computer aided design system, results to date in developing IPAD products and associated technology, and industry experiences and plans to exploit these products. For individual titles, see N83-17116 through N83-17140.

N83-17116*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IPAD PROJECT OVERVIEW
Robert E. Fulton *In its* IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 1-20 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

To respond to national needs for improved productivity in engineering design and manufacturing, a NASA supported joint industry/government project is underway denoted Integrated Programs for Aerospace-Vehicle Design (IPAD). The objective is to improve engineering productivity through better use of computer technology. It focuses on development of technology and associated software for integrated company-wide management of engineering information. The project has been underway since 1976 under the guidance of an Industry Technical Advisory Board (ITAB) composed of representatives of major engineering and computer companies and in close collaboration with the Air Force Integrated Computer-Aided Manufacturing (ICAM) program. Results to date on the IPAD project include an in-depth documentation of a representative design process for a large engineering project, the definition and design of computer-aided design software needed to support that process, and the release of prototype software to integrate selected design functions. Ongoing work concentrates on development of prototype software to manage engineering information, and initial software is nearing release. Author

N83-17117*# North American Rockwell Corp., El Segundo, Calif.
INDUSTRY INVOLVEMENT IN IPAD THROUGH THE INDUSTRY TECHNICAL ADVISORY BOARD
Warren E. Swanson *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 21-26 (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

In 1976 NASA awarded The Boeing Company a contract to develop IPAD (Integrated Programs for Aerospace-Vehicle Design). This contract included a requirement for Boeing to form an Industrial Technical Advisory Board (ITAB), with members representing major aerospace and computer companies. The purpose of this board was to guide the development of IPAD. The specific goal of IPAD is to increase United States aerospace industry productivity through the application of computers to manage engineering data. This goal clearly is attainable; in fact, IPAD's influence can reach beyond the aerospace industry to many businesses where product development is based on the design-building process. An enhanced IPAD, therefore, is a national asset of significance. The role of ITAB in guiding the development of this system is described. Author

N83-17118*# Boeing Commercial Airplane Co., Seattle, Wash.
INTEGRATION OF DESIGN INFORMATION
Gordon L. Anderton *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 27-42 (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The overall concepts of the integrated programs for aerospace-vehicle design (IPAD) from the user's viewpoint are discussed. Also a top-level view of what the user requires from such a system is provided, and the interactions between the system and user are described. The four major components discussed are design process; data storage, management and manipulation; user interface; and project management. Although an outgrowth of aerospace production experience, the basic concepts discussed, and especially their emphasis on integration, are considered applicable to all problem solving. Thus, these concepts may offer a broad base for exploitation by industry in general. This is the first in a set of three papers, the other two being Future Integrated Design Process, by D. D. Mayer, and Requirements for Company-Wide Management of Engineering Information, by J. W. Southall. In addition to tying the three together, how project management can be handled in a computing environment and also the user interface needs are discussed in detail. Author

N83-17119*# Boeing Commercial Airplane Co., Seattle, Wash.
FUTURE INTEGRATED DESIGN PROCESS
Donald D. Meyer *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 43-58 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The design process is one of the sources used to produce requirements for a computer system to integrate and manage product design data, program management information, and technical computation and engineering data management activities of the aerospace design process. Design activities were grouped chronologically and explored for activity type, activity interface, data quantity, and data flow. The work was based on analysis of the design process of several typical aerospace products, including both conventional and supersonic airplanes and a hydrofoil design. Activities examined included research, preliminary design, detail design, manufacturing interface, product verification, and product support. The design process was then described in an IPAD environment--the future. Author

N83-17120*# Boeing Commercial Airplane Co., Seattle, Wash.
REQUIREMENTS FOR COMPANY-WIDE MANAGEMENT
John W. Southall *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 59-74 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

Computing system requirements were developed for company-wide management of information and computer programs in an engineering data processing environment. The requirements are essential to the successful implementation of a computer-based engineering data management system; they exceed the capabilities provided by the commercially available data base management systems. These requirements were derived from a study entitled The Design Process, which was prepared by design engineers experienced in development of aerospace products. Author

N83-17121*# Boeing Computer Services, Inc., Seattle, Wash.
PRELIMINARY DESIGN OF A FUTURE INTEGRATED DESIGN SYSTEM
Ralph M. Diggins *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 75-94 refs (For primary document see N83-17115 07-61) (Contract NAS1-14700)
Avail: NTIS HC A17/MF A01 CSCL 09B

IPAD is a system of computer programs and data supporting the aerospace-vehicle design process by providing a set of services to aid in the management of a design project, project technical work, and project support work. Its purpose is to integrate people, programs, and data into a unified aerospace-vehicle design system. All project-management and technical data, together with certain standard data, are stored in a data base. The IPAD functions allow project personnel to query the data base and to perform operations on the data. This permits the orderly sequencing of the task elements of a complex operation and provides common access to a single data base by various participating groups who otherwise would require many separate files. These capabilities will be provided on a single host computer or across multiple heterogeneous computers on a distributed progress basis. Author

N83-17122*# Boeing Computer Services, Inc., Seattle, Wash.
EXECUTIVE AND COMMUNICATIONS SERVICES TO SUPPORT THE IPAD ENVIRONMENT
J. G. Tanner, D. M. Kirkwood, and F. M. Ives *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 95-144 refs (For primary document see N83-17115 07-61)

Avail: NTIS HC A17/MF A01 CSCL 09B

The principal purposes of the prototype executive software are to provide a system independent interface to the underlying host system and to allow for extension to full IPAD executive services as described in the preliminary design. A basic set of functions is included in the prototype to meet the requirements of the other components of the prototype, principally IPID, the IPAD data management system. The functions were chosen so that they would be readily built on any of the proposed host systems with minimal redesign and execution overhead. The functions fall into five categories: access to host data, access to data files, access to communication services, data transformation, and instrumentation for performance measurement. Communication services provide message delivery between processes in a network of heterogeneous computers. Data transformation services and communication services ensure data type validity and data integrity of messages exchanged between processes. Author

N83-17123*# Boeing Computer Services, Inc., Seattle, Wash.
AN ENGINEERING DATA MANAGEMENT SYSTEM FOR IPAD
H. R. Johnson, D. L. Comfort, and D. D. Shull *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 145-178 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

An overview of the capabilities and software architecture of the IPAD information processor (IPIP) is presented. IPIP is a state-of-the-art data base management system that satisfies engineering requirements not addressed by present day commercial systems. It also significantly advances a number of capabilities that are offered commercially. IPIP capabilities range from support for multiple schemas and data models to support for distributed processing, configuration control, and data inventory management. IPIP exploits semantic commonality in features offered in various forms at different user interfaces in today's commercial systems. An integrated software architecture supports all user interfaces: programming languages, interactive data manipulation, and schema languages. This approach promotes simplicity and compactness in software and permits features to be ofered symmetrically across all appropriate user interfaces. Author

N83-17124*# Boeing Computer Services, Inc., Seattle, Wash.
AN APPROACH FOR MANAGEMENT OF GEOMETRY DATA
R. Peter Dube, Gary J. Herron, Jean E. Schweitzer, and Erich R. Warkentine *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 179-202 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The strategies for managing Integrated Programs for Aerospace Design (IPAD) computer-based geometry are described. The computer model of geometry is the basis for communication, manipulation, and analysis of shape information. IPAD's data base system makes this information available to all authorized departments in a company. A discussion of the data structures and algorithms required to support geometry in IPIP (IPAD's data base management system) is presented. Through the use of IPIP's data definition language, the structure of the geometry components is defined. The data manipulation language is the vehicle by which a user defines an instance of the geometry. The manipulation language also allows a user to edit, query, and manage the geometry. The selection of canonical forms is a very important part of the IPAD geometry. IPAD has a canonical form for each entity and provides transformations to alternate forms; in particular, IPAD will provide a transformation to the ANSI standard. The DBMS schemas required to support IPAD geometry are explained. Author

N83-17125*# Boeing Co., Seattle, Wash.
USER INVOLVEMENT IN IPAD SOFTWARE DEVELOPMENT
Walter A. Bryant and Harold A. Crowell *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The extensive user involvement in the software development of IPAD and the functionality of the IPAD prototype as viewed by the user are addressed. Although not a production system that can support an ongoing design process, the IPAD prototype is useful for the potential user as well as the interested system designer and is an essential tool for the companies committed to the use of the IPAD system. User refers to the engineer or manager responsible for the design, manufacture, or maintenance of a product, together with those supporting these functions. Author

N83-17126*# Boeing Commercial Airplane Co., Seattle, Wash.
IPAD PRODUCTS AND IMPLICATIONS FOR THE FUTURE
Ralph E. Miller, Jr. *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 219-234 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The betterment of productivity through the improvement of product quality and the reduction of cost is addressed. Productivity improvement is sought through (1) reduction of required resources, (2) improved ask results through the management of such saved resources, (3) reduced downstream costs through manufacturing-oriented engineering, and (4) lowered risks in the making of product design decisions. The IPAD products are both hardware architecture and software distributed over a number of heterogeneous computers in this architecture. These IPAD products are described in terms of capability and engineering usefulness. The future implications of state-of-the-art IPAD hardware and software architectures are discussed in terms of their impact on the functions and on structures of organizations concerned with creating products. Author

N83-17127*# Lockheed-Georgia Co., Marietta.
CASE STUDY: LOCKHEED-GEORGIA COMPANY INTEGRATED DESIGN PROCESS
C. Thurman Waldrop *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 235-247 (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

A case study of the development of an Integrated Design Process is presented. The approach taken in preparing for the development of an integrated design process includes some of the IPAD approaches such as developing a Design Process Model, cataloging Technical Program Elements (TPE's), and examining data characteristics and interfaces between contiguous TPE's. The implementation plan is based on an incremental development of capabilities over a period of time with each step directed toward, and consistent with, the final architecture of a total integrated system. Because of time schedules and different computer hardware, this system will not be the same as the final IPAD release; however, many IPAD concepts will no doubt prove applicable as the best approach. Full advantage will be taken of the IPAD development experience. A scenario that could be typical for many companies, even outside the aerospace industry, in developing an integrated design process for an IPAD-type environment is represented. Author

N83-17128*# Pratt and Whitney Aircraft, East Hartford, Conn.
INTEGRATED CAD/CAM: PROBLEMS, PROGNOSIS, AND ROLE OF IPAD
Edwin N. Nilson *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 247-258 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

Major technology problems impede the development and evolution of totally integrated interactive CAD/CAM systems. IPAD is playing an important role in the identification of these problems and is contributing significantly to their solution. It is the purpose of this presentation to examine some of these issues, look at the prognosis of obtaining effective solutions, and point up some of the past and expected contributions of IPAD to this technology. Author

N83-17129*# Rockwell International Corp., Los Angeles, Calif. Computer-Aided Design.
COMPUTER-AIDED DESIGN DEVELOPMENT TRANSITION FOR IPAD ENVIRONMENT
Herschel G. Owens, Wendell D. Mock, and James C. Mitchell *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 259-278 (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The relationship of federally sponsored computer-aided design/computer-aided manufacturing (CAD/CAM) programs to the aircraft life cycle design process, an overview of NAAD'S CAD development program, an evaluation of the CAD design process, a discussion of the current computing environment within which NAAD is developing its CAD system, some of the advantages/disadvantages of the NAAD-IPAD approach, and CAD developments during transition into the IPAD system are discussed. Author

N83-17130*# Control Data Corp., Minneapolis, Minn.
IPAD: A COMPUTER VENDOR'S PERSPECTIVE
Harley D. Feldman *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 179-284 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The current IPAD technology and the state-of-the-art in computer technology are compared from the point of view of a computer vendor. Issues of engineering data management, distributed architectures, and user interfaces are covered. Author

N83-17131*# Digital Equipment Corp., Maynard, Mass.
IMPLEMENTING AN INTEGRATED ENGINEERING DATA BASE SYSTEM: A DEVELOPER'S EXPERIENCE AND THE APPLICATION TO IPAD
Everett A. Bruce *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 285-294 (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The software developed by the IPAD project, a new and very powerful tool for the implementation of integrated Computer Aided Design (CAD) systems in the aerospace engineering community, is discussed. The IPAD software is a tool and, as such, can be well applied or misapplied in any particular environment. The many benefits of an integrated CAD system are well documented, but there are few such systems in existence, especially in the mechanical engineering disciplines, and therefore little available experience to guide the implementor. Author

N83-17132*# General Motors Corp., Detroit, Mich. Environmental Activities Staff.
IPAD: AS IT RELATES TO THE UTILIZATION OF CAD/CAM IN GENERAL MOTORS SYNOPOSIS
Betsy Ancker-Johnson *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 295-298 (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

Automotive engineering is discussed, with reference to CAD/CAM. N.W.

N83-17133*# Cessna Aircraft Co., Vandalia, Ohio.
TURNKEY CAD/CAM SELECTION AND EVALUATION
Ted Moody *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 299-304 (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The methodology to be followed in evaluating and selecting a computer system for manufacturing applications is discussed. Main frames and minicomputers are considered. Benchmark evaluations, demonstrations, and contract negotiations are discussed. R.J.F.

N83-17134*# Vought Corp., Dallas, Tex.
OBSERVATIONS BASED ON DEVELOPMENT OF A COMPUTER AIDED DESIGN SYSTEM
Howard Best *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 305-310 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The impact of computer aided design for manufacturing is discussed. Productivity improvements, the effects on organizational structure, user training, procurement, and data bases are discussed. R.J.F.

N83-17135*# Naval Weapons Center, China Lake, Calif.
INTERACTIVE GRAPHICS
Dale Christensen *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 311-316 (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The installation of minicomputer turnkey engineering interactive graphics systems at the Navy's laboratories is discussed. It is concluded that it will provide the capabilities which will allow the engineer to more quickly resolve engineering problems and approve engineering changes. Efficiency will be increased. The technology will allow the Navy and its contractors to design and produce better engineered systems more quickly at a reduced cost. R.J.F.

N83-17136*# Tektronix, Inc., Beaverton, Oreg.
DATA BASE SYSTEMS IN ELECTRONIC DESIGN ENGINEERING
Del Williams *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 317-324 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The concepts of an integrated design data base system (DBMS) as it might apply to an electronic design company are discussed. Data elements of documentation, project specifications, project tracking, firmware, software, electronic and mechanical design can be integrated and managed through a single DBMS. Combining the attributes of a DBMS data handler with specialized systems and functional data can provide users with maximum flexibility, reduced redundancy, and increased overall systems performance. Although some system overhead is lost due to redundancy in transitory data, it is believed the combination of the two data types is advisable rather than trying to do all data handling through a single DBMS. R.J.F.

N83-17137*# Digital Equipment Corp., Maynard, Mass. Corporate Research Group.
SYSTEMS ARCHITECTURE FOR DISTRIBUTED APPLICATIONS
Richard Peebles *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 325-340 refs (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

This paper describes the kernel of a distributed operating system called ADAPT. The system runs on top of existing single host operating systems that are networked together. It's purpose is to transform this network of individual systems into a single system that will be easier for application programmers to use. This single system need not be monolithic; ADAPT facilitates the construction of both integrated and modular distributed systems. Author

N83-17138*# General Motors Corp., Anderson, Ind. Product Engineering Computer Graphics.
A REMOTE COMPUTER GRAPHICS USER AT GENERAL MOTORS
Harry S. Murphy *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1982 p 341-352 (For primary document see N83-17115 07-61)
Avail: NTIS HC A17/MF A01 CSCL 09B

The successful use of automotive body surface design data is described. This data has been originally created elsewhere in GM's two large computer graphics systems of CADANCE and Fisher Graphics. As a supplier exterior lighting components, radiator grilles, energy absorbing soft faced bumper systems, and other associated items, Guide has become most dependent on the corporate

computer graphics systems to supply accurate car body styling and sheet metal surfacing information for the design of their products. The presentation includes the origin and transfer of design data to a remote user site; its use in the design of their products; and the ultimate production of detailed drawings, N/C punched tapes, and subsequent downstream transfers of detailed part data to a turnkey system for tool design purposes. B.W.

N83-17139*# Grumman Aerospace Corp., Bethpage, N.Y.
MANUFACTURING COST/DESIGN SYSTEM: A CAD/CAM DIALOGUE
Henry H. Loshigian, Bernard I. Rachowitz, and David Judson (Wright-Patterson AFB, Ohio) *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 353-368 (For primary document see N83-17115 07-61) Avail: NTIS HC A17/MF A01 CSCL 09B

The development of the Manufacturing Cost/Design System (MC/DS) will provide the aerospace design engineer a tool with which to perform heretofore impractical design manufacturing cost tradeoffs. The Air Force Integrated Computer Aided Manufacturing (ICAM) Office has initiated the development and demonstration of an MC/DS which, when fully implemented, will integrate both design and manufacturing data bases to provide real time visibility into the manufacturing costs associated with various design options. The first release of a computerized system will be made before the end of 1981. Author

N83-17140*# Computervision Corp., Bedford, Mass.
TURNKEY CAD/CAM SYSTEMS' INTEGRATION WITH IPAD SYSTEMS
Robert E. Blauth *In* NASA. Langley Research Center IPAD: Integrated Programs for Aerospace-Vehicle Design Sep. 1980 p 369-378 refs (For primary document see N83-17115 07-61) Avail: NTIS HC A17/MF A01 CSCL 09B

Today's commercially available turnkey CAD/CAM systems provide a highly interactive environment, and support many specialized application functions for the design/drafting/manufacturing process. This paper presents an overview of several aerospace companies which have successfully integrated turnkey CAD/CAM systems with their own company wide engineering and manufacturing systems. It also includes a vendor's view of the benefits as well as the disadvantages of such integration efforts. Specific emphasis is placed upon the selection of standards for representing geometric engineering data and for communicating such information between different CAD/CAM systems. Author

N83-17141*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE REED-SOLOMON ENCODERS: CONVENTIONAL VERSUS BERLEKAMP'S ARCHITECTURE
Marvin Perlman and Jun-Ji Lee 1 Dec. 1982 70 p refs (NASA-CR-169754; JPL-Pub-82-71; NAS 1.26:169754) Avail: NTIS HC A04/MF A01 CSCL 09B

Concatenated coding was adopted for interplanetary space missions. Concatenated coding was employed with a convolutional inner code and a Reed-Solomon (RS) outer code for spacecraft telemetry. Conventional RS encoders are compared with those that incorporate two architectural features which approximately halve the number of multiplications of a set of fixed arguments by any RS codeword symbol. The fixed arguments and the RS symbols are taken from a nonbinary finite field. Each set of multiplications is bit-serially performed and completed during one (bit-serial) symbol shift. All firmware employed by conventional RS encoders is eliminated. Author

N83-17142# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
USER'S GUIDE FOR PATTERN: A PICTURE- AND MODEL-GENERATING INTERACTIVE COMPUTER GRAPHICS PROGRAM Final Report
Les Guice, Charles Schroeder, William Fithin, and Michael E. George May 1982 74 p
(AD-A119822; WES-INSTRUCTION-K-82-5) Avail: NTIS HC A04/MF A01 CSCL 09/2

PATTERN computer program is a two dimensional picture-generating program designed to assist the user in creating maps, diagrams, charts, pictures, and simple models. The engineer can use the program to assist in constructing a model for an analytical procedure and use the geometric data generated by this program to interface a complicated analysis program of his own. GRA

N83-17143# Naval Ship Research and Development Center, Bethesda, Md. Computation, Mathematics and Logistics Dept.
THE GPRIME APPROACH TO GEOMETRIC MODELING: INTRODUCTION TO THE LANGUAGE PROCESSOR AND FINITE ELEMENT APPLICATIONS
Dolores R. Wallace and James M. McKee Sep. 1982 30 p refs (AD-A120011; DTNSRDC-82-090) Avail: NTIS HC A03/MF A01 CSCL 12/1

The role of geometric modeling in the evolving field of automated analysis and design has shown the need for complete geometric representations of structures. The GPRIME geometric modeling system is at the fore-front of the interactive systems addressing this need. The GPRIME system consists of an interactive geometric moldeler and for finite element data generators. GGEN is used to generate general finite elements, particularly two dimensional elements. SOLIDGEN is used in three dimensional solid modeling. Both GGEN and SOLIDGEN are dependent on the geometric model defined in GPRIME. This report summarizes both the development of geometric modeling in automated design and analysis and the GPRIME geometric modeling system.
Author (GRA)

N83-17144# Systems Architects, Inc., Randolph, Mass.
COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK. VOLUME 2: QUALITY FACTOR MODULES
Hanscom AFB, Mass. ESD May 1982 513 p
(Contract F19628-80-C-0207)
(AD-A120376; ESD-TR-82-143(2)) Avail: NTIS HC A22/MF A01 CSCL 09/2

This volume describes the eleven quality factor modules and their subbreakouts. Each module contains a complete hierarchy of worksheet sets with instructions on how and when to use them. Author (GRA)

N83-17145# Texas Univ., Austin. Dept. of Computer Sciences.
DISTRIBUTED COMPUTATION ON GRAPHS: SHORTEST PATH ALGORITHMS
K. M. Chandy and J. Misra Mar. 1982 22 p refs
(Grant AF-AFOSR-0205-81; AF Proj. 2304)
(AD-A120356; TR-LCS-8203; AFOSR-82-0881TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The authors use the paradigm of diffusing computation, introduced by Dijkstra and Scholten, to solve a class of graph problems. They present a detailed solution to the problem of computing shortest paths from a single vertex to all other vertices, in the presence of negative cycles. Author (GRA)

N83-17146# Texas Univ., Austin. Dept. of Computer Sciences.
A DISTRIBUTED DEADLOCK DETECTION ALGORITHM AND ITS CORRECTNESS PROOF
K. M. Chandy, J. Misra, and L. Haas Feb. 1982 22 p refs
(Grant AF-AFOSR-0205-81; AF Proj. 2304)
(AD-A120371; TR-LCS-8204; AFOSR-82-0882TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

This paper presents a very simple distributed algorithm for deadlock detection in a network of processes. The algorithm is proven correct, i.e., we show that all true deadlocks are detected and no false reporting of deadlock occurs. In the algorithm no process maintains global information. All messages have identical length and are short, consisting of a single node name and a sequence number. Work is based on the work of Dijkstra and Scholten on termination detection of diffusing computations. GRA

N83-17147# Maryland Univ., College Park. Dept. of Computer Science.

DAISTS: A SYSTEM FOR USING SPECIFICATIONS AND VERIFICATIONS TO TEST IMPLEMENTATIONS
Paul Raymond McMullin Jun. 1982 129 p refs
(Contract F49620-80-C-0001; AF Proj. 2304)
(AD-A120219; AFOSR-82-0867TR) Avail: NTIS HC A07/MF A01 CSCL 09/2

DAISTS (Data Abstraction Implementation, Specification, and Testing System) combines a data abstraction language containing SIMULA-like classes with algebraic specifications and a library of testing monitoring routines. Each axiom equates two sequences of function compositions; the axioms are checked against the implementation by comparing the results of the function compositions for a finite set of test points with a user-supplied equality testing operation. Inconsistencies between the axioms and the implementation are reported as they are detected. While running the tests, the system also monitors statement execution and expression evaluation. By insisting that enough test data be supplied to execute each statement and axiom and to vary the value of each sub-expression, DAISTS helps users develop an effective set of test cases. The author has evaluated DAISTS both to demonstrate its worth during program development and to find its weaknesses. An experiment was performed that compared program development with DAISTS against more conventional program development. The author showed that 'non-expert' programmers could use formal specifications in program development. The author also used DAISTS in an implementation of a simple text editor, similar to one in Kernighan and Plauger's Software Toos book, to show that DAISTS can effectively be employed in the development of complex software.
Author (GRA)

N83-17148# Maryland Univ., College Park. Dept. of Computer Science.
DETECTION OF INHERENT DEADLOCKS IN DISTRIBUTED PROGRAMS
Kegang Hao and Raymond T. Yeh Jun. 1982 8 p refs
(Contracts F49620-80-C-0001; DASG60-82-C-0006)
(AD-A120205; AFOSR-82-0864TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

In this paper, the concept of 'inherent deadlock' in distributed programs is defined. Several algorithms for detecting inherent deadlocks are given. Deadlock prevention is crucial in distributed programs. In order to ensure the correctness of a distributed program, we must avoid the occurrence of the deadlock in its execution. Unfortunately, the deadlock problem in distributed program is undecidable, as the halting problem in the sequential problem. However, partial solutions to the deadlock problem exist. In this the authors shall investigate the detection of inherent deadlocks in distributed programs. There are many models for distributed programs. In this paper, the authors shall use the model of Communicating Sequential Processes (CSP) developed by Hoare. In section 2 they develop some simplifications and abstractions of CSP and define the concept of 'inherent deadlock'. They solve its decision problem. In section 3 the authors define the concept of D-execution, and obtain a sufficient condition and a corresponding algorithm for detecting inherent deadlock. In sections 4 and 5 the authors introduce the concept 'matching number' as the foundation for obtaining two sufficient conditions for detecting inherent deadlock. Then they reduce these conditions to the solvability of some kind of indeterminate equation and give its decision algorithm. GRA

N83-17149# Systems Architects, Inc., Arlington, Va.
COMPUTER SYSTEMS ACQUISITION METRICS HANDBOOK. VOLUME 1: INTRODUCTION AND GENERAL INSTRUCTIONS
May 1982 52 p
(Contract F19628-80-C-0207)
(AD-A120375; ESD-TR-82-143(1)) Avail: NTIS HC A04/MF A01 CSCL 09/2

This volume provides an overview to a standard set of procedures for qualitatively specifying and measuring the quality of a computer software system during its acquisition life cycle.
Author (GRA)

N83-17150# Advanced Information and Decision Systems, Mountain View, Calif.
DESIGN OF AN INTELLIGENT PROGRAM EDITOR Final Technical Report, 1 Jan. - 31 Jul. 1982
Daniel G. Shapiro, Brian P. McCune, and Gerald A. Wilson Sep. 1982 108 p refs
(Contract N00014-82-C-0119)
(AD-A120319; AI/DS-TR-3023-1) Avail: NTIS HC A06/MF A01 CSCL 09/2

This report discusses results of a project to develop a functional design for and assess the feasibility of an intelligent program editor for ADA and other programming languages. The editor will support program development and maintenance activities by providing advanced techniques for searching through programs, manipulating programs, analyzing programs for potential errors and good style, and maintaining structured documentation. These techniques are based on knowledge-based systems technology from the field of artificial intelligence. Feasibility of the program editor is demonstrated by a functional design and an initial implementation of the multiple knowledge bases representing a small program and a search (query) mechanism that uses them. The use of such an editor implies significant benefits for programmer productivity, program reliability, and life-cycle costs. Author (GRA)

N83-17151# Massachusetts Univ., Amherst. Dept. of Electrical and Computer Engineering.
ON THE INSTABILITY OF THE SLOTTED ALOHA MULTI-ACCESS ALGORITHM
Walter A. Rosenkrantz and Donald Towsley 19 Aug. 1982 8 p refs
(Grants NSF ECS-79-21140; AF-AFOSR-0167-82; AF Proj. 2304)
(AD-A120267; AFOSR-82-0848TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The slotted ALOHA multiaccess algorithm for the infinite user model is shown to be unstable via a martiangale method of independent interest. Consequently, the hypothesis of statistical equilibrium used to calculate the maximum throughput is not valid. Author (GRA)

N83-17152# California Univ., Berkeley. Dept. of Electrical Engineering and Computer Sciences.
AN EXPERIMENT IN TABLE DRIVEN CODE GENERATION
Susan L. Graham, Robert R. Henry, and Robert A. Schulman 1982 13 p refs
(Contract N00039-82-C-0235; Grant NSF MCS-80-05144; DARPA Order 4031)
(AD-A120610) Avail: NTIS HC A02/MF A01 CSCL 09/2

We have constructed a local code generator for the VAX-11 using a parser-like instruction pattern matcher. The code generator replaces the second pass of the UNIX Portable C compiler. This paper describes the design of the code generator and the special considerations imposed by the pattern matching process. We summarize the structure of the machine description grammar and its associated semantic actions, as well as the tools we developed to manipulate the large VAX description. In our experience, this approach makes the instruction selection phase of the compiler easier and faster to implement, and more likely to be correct than traditional techniques. GRA

N83-17153# Naval Postgraduate School, Monterey, Calif. Dept. of Computer Science.
FUNCTIONAL PASCAL: AN INTERIM SOLUTION TO A CHANGING COURSE IN PROGRAMMING LANGUAGE DEVELOPMENT M.S. Thesis
Otis Dennis Borcheller and Ron Scott Ross Jun. 1982 164 p refs
(AD-A120399) Avail: NTIS HC A08/MF A01 CSCL 09/2

The theory of pure functional programming is applied to the standard conventional programming language PASCAL, thereby offering a unique and innovative language for problem-solving. A basic set of primitive functions and functional forms, as outlined in the Backus FP System, provides a model for the development of a practical functional programming system. This system is

activated by accessing a detailed and comprehensive system library module directly from a PASCAL program, thereby enabling the user to operate in either a functional or a conventional mode. The ability to perform functional programming within a conventional, high-level language, adds an increased degree of power and flexibility to the proposed system. The Functional PASCAL System provides the user with a new and distinctive methodology for writing computer programs and encourages individuals to experiment, in a practical environment, with functional programming techniques not otherwise available for general purpose use. GRA

N83-17154# Proprietary Software Systems, Inc., Beverly Hills, Calif.
JOVIAL (J73) TO ADA TRANSLATOR Final Technical Report, Jun. 1981 - Mar. 1982
Mark J. Neiman Griffiss AFB, N.Y. RADC Jun. 1982 115 p refs
(Contract F30602-81-C-0217; AF Proj. 5581)
(AD-A120472; RADC-TR-82-175) Avail: NTIS HC A06/MF A01 CSCL 09/2

This document contains the functional description and system/subsystem specifications for a JOVIAL J73/Ada translator, and guidelines for J73 programmers who anticipate their programs will be converted to ADA at a later date. The functional description specifies the maximum JOVIAL J73 subset that can be converted to ADA. Techniques for the optimum automatic translation of the source code are specified. The J73 constructs that cannot be automatically translated are identified. The system/subsystem specification provides a more detailed breakdown of the proposed translator. GRA

N83-17155# Stanford Univ., Calif.
RESEARCH IN VLSI SYSTEMS Technical Status Report, Mar. 1981 - May 1982
J. Hennessy, R. Matthews, J. Newkirk, and T. Kailath Sep. 1982 22 p refs
(Contract MDA903-79-C-0680; DARPA Order 3773)
(AD-A120454) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report summarizes progress on Research in VLSI Systems, from March 1981 to May 1982. The major areas under investigation are design description and synthesis, testing, and algorithms and architectures. In each area, our aim is to anticipate and to solve problems attendent to VLSI. We introduce the research in detail and discuss progress; we also discuss important practical developments. The bibliography list research papers describes the work in greater depth. Author (GRA)

N83-17156# Pacific Northwest Lab., Richland, Wash.
USER'S GUIDE TO THE MESOI DIFFUSION MODEL AND TO THE UTILITY PROGRAMS UPDATE AND LOGRVU
G. F. Athey, K. J. Allwine, and J. V. Ramsdell Nov. 1981 71 p refs
(Contract DE-AC06-76R-01830)
(DE82-004738; PNL-3999) Avail: NTIS HC A04/MF A01

MESOI is an interactive, Lagrangian puff trajectory diffusion model. MESOI users are given the information needed to successfully conduct model simulations. The user is also provided with guidance in the use of the data file maintenance and review programs; UPDATE and LOGRVU. Complete examples are given for the operation of all three programs and an appendix documents UPDATE and LOGRVU. DOE

N83-17157# California Univ., Livermore. Lawrence Livermore Lab.
PRAXIS CONVERSION UTILITIES
J. M. Duffy, J. R. Greenwood, and R. Shapiro (Bolt, Beranek and Newman, Inc., Canoga Park, Calif.) 2 Dec. 1981 28 p
(Contract W-7405-eng-48)
(DE82-006252; UCID-19265) Avail: NTIS HC A03/MF A01

The Praxis Conversion Utilities are a set of Praxis routines which convert data objects to/from Ascii strings. For instance, the AsciiInteger function converts an array of characters to an integer value. These routines are implemented as a consistent set of utilities with complete control over the various formatting options and fill characters. Most of the parameters for each routine are optional such that they are easy to invoke for standard cases, yet allowing the detailed control when necessary. DOE

N83-17158# Sandia Labs., Albuquerque, N. Mex.
COMPARISON OF IIR ADAPTIVE ALGORITHMS
R. A. David and S. D. Stearns 1981 5 p refs Presented at the 15th Ann. Asilomar Conf. on Circuits, Systems and Computers, Monterey, Calif., 9 Nov. 1981
(Contract DE-AC04-76DP-00789)
(DE82-003047; SAND-81-2540C; CONF-811139-3) Avail: NTIS HC A02/MF A01

The performance of different IIR adaptive algorithms are compared. Due to the non-quadratic nature of the performance surface and to potential instability, the IIR algorithms have design problems not encountered with FIR adaptive algorithms. Simple two-pole adaptive algorithms whose performance, based on experimental results, appears to represent an improvement over the existing RLMS (Recursive Least Mean Squares) algorithm are presented. DOE

N83-17159# Los Alamos Scientific Lab., N. Mex.
FORSIG: AN EXTENTION OF FORTRAN WITH SIGNIFICANCE ARITHMETIC
James M. Hyman Sep. 1982 103 p refs
(Contract W-7405-eng-36)
(DE83-001955; LA-9448-MS) Avail: NTIS HC A06/MF A01

An arithmetic, called significance arithmetic, and a FORTRAN-like language, called FORSIG, that account for the creation and propagation of errors in a computer program due to uncertainties in the data are described. To compute reasonable and accurate bounds on these errors, the dependencies developing between the variables during execution are monitored automatically and used by the significance arithmetic algorithms. These dependencies are also a measure of the sensitivity of the solution as a function of the error in the data. DOE

N83-17160# Sandia Labs., Albuquerque, N. Mex.
DESCRIPTION OF THE COMPUTER PROGRAM COCOMP
Elizabeth L. Frost Jul. 1982 74 p refs
(Contract DE-AC04-76DP-00789)
(DE82-018929; SAND-79-0028) Avail: NTIS HC A04/MF A01

A users guide to COCOMP is provided. It is assumed that the user is familiar with COCOM. COCOMP does three things: accepts measurement data from product inspection of a number of similar parts; operates on and transforms these data in a way that affords the parts their best chance of conforming to product drawing requirements when the transformed data are compared with these requirements; organizes and summarizes the transformed data in ways that allow pertinent comparisons with the drawing requirements to be made so as to determine whether and to what extent the latter are met for each part while providing valuable information about the capability of the machine that produced the parts. The documentation is divided into two parts. The first part is a description of the input as provided by the user. The various options are detailed and explanations of them provided. Where it is deemed appropriate examples are provided to assist in the explanation of aspects of the input. The second part describes the output options via examples. The examples were selected to cover all of the possible options than can be handled by the program. A glossary of items is also provided. DOE

N83-17161# Los Alamos Scientific Lab., N. Mex.
IMPLEMENTING ASPEN ON THE CRAY COMPUTER
Kenneth H. Duerre and Amar C. Bumb (Wyoming Univ., Laramie) 1981 10 p refs Prepared for presentation at the AICHE Natl. Winter Meeting, Orlando, Fla., 28 Feb. - 4 Mar. 1982
(Contract W-7405-eng-36)
(DE82-004360; LA-UR-81-3528; CONF-820202-3) Avail: NTIS HC A02/MF A01

The approach to converting ASPEN and the conversion problems are discussed, including plans for optimizing the program.

The CRAY computer is two-to-five times faster than a CDC-7600 for scalar operations, is equipped with up to two million words of high-speed storage, and has vector processing capability. Comparisons of run times for test problems between the CRAY and IBM 370 computer versions are presented. DOE

N83-17162# North Carolina Agricultural and Technical State Univ., Greensboro.
CONVERSION OF THE SPAR FINITE ELEMENT CODE TO DEC-10 COMPUTER SYSTEMS
William J. Craft and DeRome O. Dunn 1981 2 p refs Presented at 1981 Fall DECUS Symp., Los Angeles, 7 Dec. 1981
(Contract W-7405-eng-26)
(DE82-005202; CONF-811214-7) Avail: NTIS HC A02/MF A01

The conversion of the PRIME Minicomputer SPAR general purpose finite element program to DEC-10 systems is described. The universal features of this code make it increasingly interesting for a variety of users. The code is cast as a set of about two dozen independent processors each one relying on a set of data base utility routines that converse with up to sixteen internally managed disk files. The software requires only a small amount of core and it can easily be adjusted to handle very large problems because such changes only involve blank common. The code is entirely FORTRAN with DEC-10 generic disk routines and three MACRO routines used only for system accounting purposes. DOE

N83-17163# Technische Hogeschool, Eindhoven (Netherlands). Group for Automatic System Design.
STRUCTURED LAYOUT DESIGN
R. H. J. M. Otten Oct. 1981 70 p refs
(EUT-80-E-111; ISBN-90-6144-0) Avail: NTIS HC A04/MF A01

Computer aided layout design for very large scale integration is introduced. System layout is defined as any set of data that uniquely specifies the masks necessary for integrating the system. Layout tasks addressed are those in which components or subsystems of fixed or variable shape have to be arranged within a given, or as small as possible, geometrical figure and to be interconnected by a network of conducting paths embedded in one or more layers, while giving due consideration to technological, electronic and economic constraints. A system design procedure, based on the analogy of a family tree, is proposed.
Author (ESA)

N83-17164# Technische Hogeschool, Eindhoven (Netherlands). Group for Information Theory.
ENCODING MOVING PICTURE BY USING ADAPTIVE STRAIGHT LINE APPROXIMATION
Wang Yen Ping Mar. 1981 28 p refs
(EUT-81-E-118; ISBN-90-6144-118-8) Avail: NTIS HC A03/MF A01

A method for redundancy reduction in encoding a moving picture is presented. A Kalman filter is used to obtain a straight line approximation to the signal on the moving part. Since the human eye is less sensitive to errors in the intensity at higher values of this intensity, the filter emphasizes intensity errors at lower values of the intensity. In order to encode the straight line approximation of the signal it is sufficient to encode their breakpoints, using the positions and the amplitudes of the straight line approximation. By considering the dependence of the position and the amplitude of a breakpoint on a line with respect to those on the adjacent lines, more redundancies can be removed. In order to provide much clearer details on the stationary part, as soon as an uncovered background is recognized, the compensating signal is added to it. The quality of pictures processed by this method is superior to that obtained by conditional replenishment.
Author (ESA)

N83-17165# Research Inst. of National Defence, Linkoeping (Sweden).
VISUAL MEMORY FOR PEV: DESIGN AND APPLICATION [BILDMINNE FOER PEV - UPPBYGGNAD OCH ANVAEDNING]
Staffan Lindstroem Feb. 1982 30 p ref In SWEDISH
(FOA-C-30259-H3) Avail: NTIS HC A03/MF A01

The use of image data storage for studying the spatial resolution enhancement of a pyroelectric vidicon device (PEV) in static and dynamic scenes, is reported. Data storage was built up of half-images and was limited to information from the PEV's circular visual field. Adding up 2 to 32 half-images and uneven/even 2 to 32 half-images can be performed. A considerable improvement in the image quality of the existing PEV camera was noted with regard to the signal to noise ratio. The storage can easily be modified and applied to other image generating optronic sensors.
Author (ESA)

N83-17166# Research Inst. of National Defence, Umea (Sweden).
TEXT FORMATTING SYSTEM FOR DIABOLO 1650 WP UNDER VAX/VMS [TESTFORMATERINGSSYSTEM FOER DIABLO 1650 UP UNDER VAX/VMS]
Alf Brunstroem Feb. 1982 29 p refs In SWEDISH
(FOA-C-40150-B1) Avail: NTIS HC A03/MF A01

A small text formatting system which includes programmable functions (shadow print, right justify, text centering) and gives printouts of high typographic quality is described. The system consists of a formatting program DIADOC and a printout program DIATYPE to be used with a text editor. A program which controls DIABOLO 1650 for different line distances, paper formats, print wheels, etc., is outlined. Author (ESA)

N83-17167# Kent Univ., Canterbury (England). Computing Lab.
EXECUTING PASCAL AND ASSEMBLY LANGUAGE PROGRAMS
Bob Bird Oct. 1981 16 p refs
(PB82-244641; UKC-Computing-Lab-11) Avail: NTIS HC A02/MF A01 CSCL 09B

The HEX29 is a micro/mini-computer fabricated from AMD 2900 family bipolar bit-slice components. It is being used as part of a research project investigating methods of providing specialized servers on SIGNET. Preparation of ASSEMBLY Language programs, Leeds PASCAL programs and the linking of ASSEMBLY routines into PASCAL are covered. The procedure for 'powering-up' the processor, bootstrapping the PASCAL interpreter (via. SIGNET) and finally loading and executing assembled for compiled code is described. GRA

N83-17168# Kent Univ., Canterbury (England). Computing Lab.
PROTOCOLS USED ON THE RING: A SIMPLE GUIDE
I. N. Dallas 18 Mar. 1981 9 p refs
(PB82-244658; UKC-Computing-Lab-10) Avail: NTIS HC A02/MF A01 CSCL 09B

The protocols on the Cambridge University computer network ring are described. GRA

N83-17169# Kent Univ., Canterbury (England). Computing Lab.
BASIC BLOCK PROTOCOL IMPLEMENTATION GUIDE
I. N. Dallas 13 Mar. 1981 11 p
(PB82-244666; UKC-Computing-Lab-9) Avail: NTIS HC A02/MF A01 CSCL 09B

A guide to Basic Block Protocol (BBP), as implemented at Kent and ERCC is presented. The Basic Block Protocol as defined by Cambridge is also included. Some implementation tips for program interrupt interfaces are included. Under normal circumstances, only type 0 BBP blocks are used, but this guide shows how the other types are handled. GRA

N83-17170# Kent Univ., Canterbury (England). Computing Lab.
COMMENTS ON STYLE IN C
R. P. A. Collinson 1981 9 p refs
(PB82-244674; UKC-Computing-Lab-7) Avail: NTIS HC A02/MF A01 CSCL 09B

The C language is often accused of being cryptic and difficult to read. If you put aside criticisms of the side effects of some statement, it seems to me that the problem is not in the language but in the way it is written. This note attempts to show my personal rules for laying out my C programs. These rules differ from the official system as shown in the C Programming Language by

Kerringhan and Riche and also are different from much of the sources supplied with the UNIX operating system. GRA

N83-17171# Science Research Council, Chilton (England).
A FLOATING POINT PROCESSOR FOR INTEL 8080A MICROPROCESSOR SYSTEMS
R. Bairstow, J. Barlow, M. Jires, and M. Waters 1982 48 p refs
(PB82-244690; RL-82020) Avail: NTIS HC A03/MF A01 CSCL 09B

An A.M.D. 9511 Floating Point Processor was interfaced to the Rutherford Laboratory Bubble Chamber Group's micro computers. These computers are based on the INTEL 8080A micro processor. The interface uses a memory mapped I/O technique to ensure rapid transfer of arguments between processors. The A.M.D. 9511 acts as a slave processor to the INTEL 8080A system. The 8080 processor is held in 'WAIT' status until completion of the A.M.D. operation. A software Macro Processor was written to effectively exend the basic INTEL 8080A instruction set to include the full range of A.M.D. 9511 instructions. GRA

N83-17172# Kent Univ., Canterbury (England). Computing Lab.
MULTIDIMENSIONAL SEARCH TREES AS INDICES OF FILES
Y. V. Silva-Filho 1981 8 p refs
(PB82-2455-8; UKC-COMPUTING-LAB-4) Avail: NTIS HC A02/MF A01 CSCL 09B

The report describes a method of using multidimensional search trees as indices of files. The advantages of this method in lieu of the standard indexed-file organization method are enumerated. Author (GRA)

N83-17173# Kent Univ., Canterbury (England). Computing Lab.
BYTE STREAMS ON A MICROCOMPUTER
T. E. Schutt Mar. 1981 24 p refs
(PB82-246893; UKC-Computing-Lab-6) Avail: NTIS HC A02/MF A01 CSCL 09B

A series of measurements which were performed to evaluate one microcomputer connected to the Cambridge ring are discussed. The machine is the WD90 Pascal MICROENGINE (a trademark of the Western Digital Computer Company) running a UCSD Pascal operating system (a trademark of Softech Microsystems). Currently this microcomputer is working as a multi server. GRA

N83-17174# Science Research Council, Chilton (England).
AN APPLE 2 BASED IMAGE DIGITISING SYSTEM FOR USE WITH IMMUNOELECTROPHORESIS PLATES
T. E. Pritchard, J. E. Bateman, and A. C. Flesher May 1982 15 p refs
(PB82-247834; RL-82-040) Avail: NTIS HC A02/MF A01 CSCL 09B

In order to undertake basic image analysis on dimensional immunoelectrophoresis plates (2-DIEP) an image digitising system was constructed using a 48k Apple 2 in conjunction with a Microworks DS-65 Digisector card which takes the video signal from a television camera in a specially constructed projection box. Accuracy and reproducibility are assured by averaging up to 16 scans and normalizing to a blank plate. Careful packing of the data permits the processing of a plate on a single Apple disk while the primary disk drive carries the system software. The plate image of 70 mm x 70 mm is digitized into an array of 128 x 128 pixels each with 64 intensity levels. GRA

N83-17175# Groningen Rijksuniversiteit (Netherlands). Mathematisch Inst.
PASCAL CODE-GENERATION FOR THE MOTOROLA 6809
J. H. Jongejan Dec. 1981 69 p
(PB82-250499; TW-237) Avail: NTIS HC A04/MF A01 CSCL 09B

The project described in this paper is part of a larger project started in the middle of 1978 at the Technical University of Twente, to implement a PASCAL system on various minicomputers. An extended PASCAL was designed and implemented. The underlying idea was to construct a four pass compiler of which the first three passes should be as independent as possible from the target machine. Projects were started, to generate compilers for the PDP-11 series, the MC68000 and the MC6809 microcomputers, and recently for the DEC10 computer. In this paper the implementation of the fourth pass of the compiler for the MC6809 microcomputer is described. Also a runtime package has been created along with a one pass assembler for the 6809. Author (GRA)

N83-17176# National Bureau of Standards, Washington, D.C. National Engineering Lab.
A COMPUTER PROGRAM FOR ANALYSIS OF DATA FROM MICROELECTRONIC TEST STRUCTURES
R. L. Mattis, L. J. Till, and R. C. Frisch Jun. 1982 40 p refs
(PB82-252347; NBSIR-82-2492) Avail: NTIS HC A03/MF A01 CSCL 13H

A computer program, STAT2, is described which performs the following functions: reads data as a two dimensional array; calculates mean, sample standards deviation, and median; identifies outliers; calculates replacement values for outliers; makes a gray-tone data map on a line printer; makes a character map on the user's terminal; constructs a data base for examining correlations among various data sets; and searches the data base for correlations using several selective keys. The emphasis is on program usage and detailed descriptions of the commands are given. Program portability and data input requirements are addressed. Guidance regarding several types of program modifications is provided. GRA

N83-17375*# Auburn Univ., Ala. Dept. of Mathematics.
A SCHEDULING ALGORITHM FOR SPACELAB TELESCOPE OBSERVATIONS
Bob Grone *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p
(For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks.

No abstracts in this category.

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N83-17177 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
SOME NOTES ON THE USE OF ORTHOGONAL SIMILARITY TRANSFORMATIONS IN CONTROL
S. J. Hammarling Aug. 1982 28 p refs
(NPL-DITC-8/82; ISSN-0143-7348) Copyright. Avail: Issuing Activity

The Schur factorization and the orthogonal equivalence transformations are discussed showing how the factorization provides a reliable means for computing the eigenvalues of the original matrix. A simple model is analyzed, adding input or control, and later feedback to the analysis. The controllability matrix, the observability matrix, and the feedback matrix are defined. The optimal control problem and the representation of the model in the frequency domain are discussed. Author (ESA)

N83-17178# Oxford Univ. (England). Engineering Lab.
ROBUSTNESS OF SELF-TUNING CONTROLLERS Ph.D. Thesis
K. W. Lim 1982 245 p refs
(OUEL-1422/82) Avail: NTIS HC A11/MF A01

The robust stability of the Clarke-Gawthrop self-tuning controller is studied. It is assumed that the self-tuning controller is set up for a nominal plant or system which differs from the true plant. The true plant is modelled as a composition of linear dynamics (the nominal plant) and unknown linear dynamics of memoryless nonlinearities. It is shown that under plant perturbations it is possible to design nonadaptive self-tuning controllers for maximizing disturbance alternation using the same parameters and frequency response curves as those used for designing robustness. In the case of adaptive self-tuning control, it is shown that the estimator present in the adaptive algorithm can be represented by a nonlinear time-varying operator which is dissipative and has a finite gain. As in the nonadaptive case, the conditions for robust stability are also obtained in terms of the self-tuner design parameters. Simulation examples are included. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N83-17179*# National Aeronautics and Space Administration, Washington, D. C.

COMPUTATION OF THE INTERVALS OF UNCERTAINTIES ABOUT THE PARAMETERS FOUND FOR IDENTIFICATION

P. Mereau and J. Raymond Aug. 1982 44 p Transl. into ENGLISH of "Calcul des Intervalles d'incertitude sur les Parametres Trouves par Identification" Groupe d'Etudes et de Recherches en Bio-Systemes, Palaiseau, France, Oct. 1979 p 1-49 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-76978; NAS 1.15:76978) Avail: NTIS HC A03/MF A01 CSCL 12A

A modeling method to calculate the intervals of uncertainty for parameters found by identification is described. The region of confidence and the general approach to the calculation of these intervals are discussed. The general subprograms for determination of dimensions are described. They provide the organizational charts for the subprograms, the tests carried out and the listings of the different subprograms. Author

N83-17180*# Tuskegee Inst., Ala. Dept. of Electrical Engineering.

SOLUTION OF NONLINEAR MULTIVARIABLE CONSTRAINED SYSTEMS USING A GRADIENT PROJECTION DIGITAL ALGORITHM THAT IS INSENSITIVE TO THE INITIAL STATE Semiannual Report

Andrew Hargrove 28 Dec. 1982 8 p refs
(Grant NAG1-172)
(NASA-CR-169752; NAS 1.26:169752) Avail: NTIS HC A02/MF A01 CSCL 12A

Optimal digital control of nonlinear multivariable constrained systems was studied. The optimal controller in the form of an algorithm was improved and refined by reducing running time and storage requirements. A particularly difficult system of nine nonlinear state variable equations was chosen as a test problem for analyzing and improving the controller. Lengthy analysis, modeling, computing and optimization were accomplished. A remote interactive teletype terminal was installed. Analysis requiring computer usage of short duration was accomplished using Tuskegee's VAX 11/750 system. Author

N83-17181*# Stanford Univ., Calif. Joint Inst. for Aeronautics and Acoustics.

ON THE RADIATION IMPEDANCE OF A RECTANGULAR PISTON

Harold Levine Aug. 1982 21 p refs
(Contract NCC2-76)
(NASA-CR-169735; NAS 1.26:169735; SU-JIAA-TR-49) Avail: NTIS HC A02/MF A01 CSCL 12A

Single integral representations for the resistive and reactive components of the radiation impedance appropriate to a rectangular piston are established, thereby enabling a systematic refinement of estimates at both short and long wave lengths. Comparisons with previous analyses are made explicit as well as extensions and corrections thereto. Author

N83-17182# Brown Univ., Providence, R. I.

ON DIFFUSION APPROXIMATION OF CONTROLLED QUEUEING PROCESSES

Yu-Chung Liao Bolling AFB, Washington, D.C. AFOSR Jun. 1982 18 p refs
(Grant AF-AFOSR-0116-81; AF Proj. 2304)
(AD-A120369; LCDS-81-18; AFOSR-82-0885TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A queueing system can be controlled by switching service rate. When there is a cost to change service rate, the control problem turns out to be a sequential decision problem, i.e., to find a sequence of optimal stopping times to switch service rate. Under heavy traffic conditions, we show that the optimal cost functions of controlled rescaled queueing processes converge to that of corresponding controlled diffusions for finite time and for infinite time with discount factor criterions. Author (GRA)

N83-17183# Brown Univ., Providence, R. I. Div. of Applied Mathematics.

ON OPTIMAL CONTROL OF A BROWNIAN MOTION

Yu-Chung Liao Jun. 1982 21 p refs
(Grants AF-AFOSR-0116-81; NSF MCS-79-03554; AF Proj. 2304)
(AD-A120370; LCDS-82-17; AFOSR-82-0884TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report discusses a controlled diffusion process which evolves as a reflected Brownian motion under each control action. A switching cost is incurred when the control action is switched. The control problem turns out to be a sequential decision problem, i.e., to find a sequence of optimal stopping times to switch control. The dynamic programming equation for a discounted cost criterion is a quasi-variational inequality. By allowing the discount factors tend to zero, we show a new Q.V.I. has a solution that serves as a potential function to give direction to attain the optimality for a long-run average cost criterion. GRA

N83-17184# Northwestern Univ., Evanston, Ill. Dept. of Applied Mathematics.

MARKOV PROCESSES APPLIED TO CONTROL, REPLACEMENT AND SIGNAL ANALYSIS Final Report, 1 Jun. 1981 - 31 May 1982

Erhan Cinlar Jul. 1982 9 p refs
(Grant AF-AFOSR-0252-80; AF Proj. 2304)
(AD-A120389; AFOSR-82-0902TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report describes the work completed under the grant in the following areas: Hunt processes; queues with random intensities; martingales, Brownian motion, stochastic integrals; stochastic means; inverse problems; Brownian motion and Reimannian geometry; mean exit time from geodesics; and seminar on stochastic processes 1982. Also included are a list of the participants in the seminar; a list of contributors and the titles of their work to the proceedings of the seminar; and a list of work completed during the last year of the grant. Author (GRA)

N83-17185# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.

COMPARISONS BETWEEN SOME ESTIMATORS IN FUNCTIONAL ERRORS-IN-VARIABLES REGRESSION MODELS

Raymond J. Carroll and Paul P. Gallo (Lederle Labs.) 1982 28 p refs Sponsored in part by NSF
(Grant AF-AFOSR-0080-80; AF Proj. 2304)
(AD-A120391; AFOSR-82-0893TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This report studies the functional errors-in-variables regression model. In the case of no equation error (all randomness due to measurement errors), the maximum likelihood estimator computed assuming normality is asymptotically better than the usual moments

estimator, even if the errors are not normally distributed. For certain statistical problems such as randomized two group analysis of covariance, the least squares estimate is shown to be better than the aformentioned errors-in-variables methods for estimating certain important contrasts. GRA

N83-17186# Florida State Univ., Tallahassee. Dept. of Statistics.
ASSOCIATION OF NORMAL RANDOM VARIABLES AND SLEPIAN'S INEQUALITY
Kumar Jogdeo (Illinois Univ., Urbana), Michael D. Perlman (Washington Univ.), and Loren D. Pitt (Virginia Univ.) Apr. 1982 10 p refs
(Contract F49620-82-K-0007; AF Proj. 2304)
(AD-A120395; FSU-Statistics-M620; TR-82-144-AFOSR; AFOSR-82-0899TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A simple extension of Slepian's inequality is given which implies the original inequality and the result that positively correlated normal variables are associated. Author (GRA)

N83-17187# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
BIVARIATE EXTREMES: MODELS AND STATISTICAL DECISION
J. Tiago deOliveira Jun. 1982 25 p refs
(Contract F49620-82-C-0009; AF Proj. 2304)
(AD-A120208; AFOSR-82-0853TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

After obtaining the asymptotic distribution of bivariate maxima, a direct characterization of the asymptotic distribution is given; the 5 known models are described through their dependence functions and some properties obtained. Known statistical decision results for the models are described. Author (GRA)

N83-17188# Pittsburgh Univ., Center for Multivariate Analysis.
THIRD ORDER EFFICIENCY OF THE MLE: A COUNTEREXAMPLE
J. K. Ghosh and B. K. Sinha Jun. 1982 15 p refs
(Contracts F49629-82-K-0001; F49620-79-C-0161; AF Proj. 2304)
(AD-A120207; TR-82-13; AFOSR-82-0860TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The authors give an example of a curved exponential where the maximum likelihood estimate is not third order efficient either in the sense of Fisher-Rao or Rao. GRA

N83-17189# Texas Univ., Austin. Dept. of Electrical Engineering.
SOME REMARKS ON OPTIMAL QUANTIZATION
Efren F. Abaya and Gary I. Wise 8 Jul. 1982 7 p refs
(Grant AF-AFOSR-0047-81; AF Proj. 2304)
(AD-A120260; AFOSR-82-0820TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Current numerical algorithms for constructing optimal quantizers encounter difficulties if either an optimal solution does not exist, or if local minima are present. In this paper, the authors show that an optimal quantizer may not always exist, and present a condition on the distortion measure and another condition on the probability distribution, either of which guarantees existence of an optimal solution. Then, we comment on the role of symmetry in optimal quantization and discuss the validity of one method that has been used to prove uniqueness of the optimal solution. GRA

N83-17190# IBM Research Lab., Yorktown Heights, N. Y.
NUMERICAL METHODS FOR STIFF AND QUADRATIC DIFFERENTIAL EQUATIONS AND FOR JOSEPHSON EQUATIONS Final Report
Werner Liniger and Farouk Odeh Aug. 1982 28 p refs
(Contract F49620-77-C-0088; AF Proj. 2304)
(AD-A120268; AFOSR-82-0852TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Stability results for one-leg methods, valid for linear variable coefficient equations and certain nonlinear systems, and for arbitrary variable integration steps, were gotten by linear and nonlinear contractivity analysis. Nonlinear A- and A(alpha)-stability results for multistep methods were obtained by Fourier transform methods. Numerical and analytic results were given for solutions of the equations governing extended Josephson junctions or two-junction interferometers. Special methods were derived for solving quadratic systems of differential equations. Author (GRA)

N83-17191# New Mexico Univ., Albuquerque. Bureau of Engineering Research.
DIAGNOSIS OF DAMAGE IN SDF STRUCTURES Annual Scientific Report, 1 Feb. 1981 - 28 Feb. 1982
Thomas L. Paez, Ming-Liang Wang, and Frederick D. Ju Mar. 1982 86 p refs
(Grant AF-AFOSR-0086-81; AF Proj. 2307)
(AD-A120183; CE-60(82)AFOSR-993-1; AFOSR-82-0865TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

A technique for the diagnosis of damage in hysteretic structures is developed. A hysteretic SDF system is modeled using a higher-order linear ordinary differential equation. Stochastic, dynamic inputs are generated and used to represent field inputs. The response on a hysteretic structure on each input is computed. The generated inputs and computed responses are used to identify the parameters of the higher-order linear model. Then the energy dissipated by the hysteretic structure and its linear model are computed and compared. It is shown that the energy dissipated by a hysteretic structure is accurately estimated by the energy dissipated in its linear model, even when the measured input and response records include measurement noise. Numerical examples are presented. Author (GRA)

N83-17192# California Univ., Santa Barbara. Inst. for the Interdesciplinary Applications of Algebra and Combinatorics.
MULTIPLICATIVITY FACTORS FOR C-NUMERICAL RADII
Moshe Goldberg (Technion - Israel Inst. of Technology) and E. G. Straus (California Univ., Los Angeles) Sep. 1982 20 p refs
(Grants AF-AFOSR-0127-79; NSF MCS-79-03162; AF Proj. 2304)
(AD-A120252; AFOSR-82-0842TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

For two n-square matrices A,C, the C-numerical radius of A is the nonnegative quantity r sub c(A) = max(/tr(CU*AU)/ : U unitary). This generalizes the classical numerical radius r(A). It is known that r sub C constitutes a norm on the algebra of n-square matrices if and only if C is nonscalar and tr C does not = 0. For all such C we obtain multiplicativity factors for r sub C, i.e., constants a > O for which ar sub C is sub-multiplicative. Author (GRA)

N83-17193# Duke Univ., Durham, N. C. Dept. of Chemistry.
SEARCH ALGORITHMS AND THEIR IMPLEMENTATION Annual Report, 1 Jul. 1981 - 30 Jun. 1982
Donald W. Loveland, Alan W. Biermann, Kevin W. Bowyer, and Robert A. Wagner Aug. 1982 21 p refs
(Grant AF-AFOSR-0221-81; AF Proj. 2304)
(AD-A120248; AFOSR-82-0878TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Research that has resulted in completed papers involved (1) optimality of search procedures (decision trees) in binary testing; (2) a study of signature table representation for evaluation functions and methods for dynamically improving function accuracy; (3) pruning minimax trees that have been adapted to incorporate moves determined by chance; and (4) the search problem in automated program construction. Preliminary results have been obtained in research on (a) optimizing limited resource is to guide otherwise random search; (b) studying search strategies in two-person games when information is partly concealed; and (c) limiting search in debugging rule sets in one type of expert knowledge system. Other investigations are in progress. Author (GRA)

N83-17194# Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE RADIX 65/39: A NEW ROOT-FINDING ALGORITHM FOR ANALYTIC EQUATIONS
Walter O. Egerland Oct. 1982 15 p refs

(DA Proj. 1L1-61102-AH-43)
(AD-A120623; AD-F300103; ARBRL-TR-02428) Avail: NTIS HC A02/MF A01 CSCL 12/1

Given a disk in the complex plane, Radix 65/39, a root searching algorithm, computes all roots of an analytic equation along a chosen diameter. Each root is bracketed by two monotone sequences. GRA

N83-17195# Naval Postgraduate School, Monterey, Calif.
SYSTEMATIC EXPERIMENTAL DETERMINATION OF DISCRETE-TIME MODELS FOR NONLINEAR SYSTEMS Ph.D. Thesis
Martin Mandelberg Jun. 1982 265 p refs
(AD-A120533) Avail: NTIS HC A12/MF A01 CSCL 12/1

Techniques are presented for experimentally computing discrete-time model equations from a finite set of samples observations of the system inputs and outputs. Existing modeling techniques typically consider simple model forms, and often make limiting assumptions and simplifications for mathematical convenience. This research extends these techniques to efficiently obtain a more accurate model equation. Four key points are examined: (1) form of the model equation, (2) choice of the error minimization technique, (3) efficiency of model determination and evaluation algorithms, and (4) interpretation of the obtained model equations in typical applications. A new algorithm for efficient model determination, the Search Indicator Growth Algorithm, is presented. This iterative algorithm efficiently evaluates a set of model terms and eliminates the undesired terms. The technique produces more accurate and robust model equations, and offers significant computational advantages over existing techniques. GRA

N83-17196# Texas Univ., Austin. Inst. for Fusion Studies.
NONLINEAR ELECTRON LANDAU DAMPING OF ION-ACOUSTIC SOLITONS
James D. Meiss and Philip J. Morrison Aug. 1982 30 p refs
(Contract DE-FG05-80ET-53088)
(DE82-021225; DOE/ET-53088/65; IFSR-65) Avail: NTIS HC A03/MF A01

The derivation begins with the coupled Vlasov-Poisson-ion fluid equations. Utilizing the standard ordering scheme of Gardner and Morikawa we obtain in Sec. II a reduced system: the coupled Vlasov-KdV equations. Instead of artificially separating resonant and nonresonant contributions, we use a subtraction procedure to isolate the nonadiabatic portion of the electron response. The Vlasov equation is solved by integrating along the electron orbits in a soliton with frozen amplitude. DOE

N83-17197# California Univ., Berkeley. Lawrence Berkeley Lab.
DUALITY ROTATIONS
Bruno Zumino Nov. 1981 13 p refs Presented at the Workshop on the Quantum Struct. of Space and Time, London, Aug. 1981
(Contract W-7405-eng-48)
(DE82-004844; LBL-13564; CONF-8108103-1) Avail: NTIS HC A02/MF A01

Irrespective of supersymmetry, it is interesting to understand the special properties of theories admitting duality rotations. The Lagrangian of such a theory transforms in a way which implies that the system of the equations of motion is invariant and that observables, such as the energy momentum tensor and therefore the total energy and momentum, are invariant. The main results on the properties of theories admitting duality rotations are described. DOE

N83-17198# Los Alamos Scientific Lab., N. Mex.
ON DUAL SPACES OF DIFFERENTIAL LIE ALGEBRAS
B. A. Kupershmidt 1981 9 p refs Presented at the LIE Algebras Conf., New Brunswick, N.J., 29-31 May 1981
(Contract W-7405-eng-36)
(DE82-004336; LA-UR-81-3324; CONF-8105134-1) Avail: NTIS HC A02/MF A01

Dual spaces of differential lie algebras are considered. Author

N83-17199# Sandia Labs., Albuquerque, N. Mex.
A MODIFIED CASCADE STRUCTURE FOR IIR ADAPTIVE ALGORITHMS
Ruth A. David 1981 5 p refs Presented at the 15th Ann. Asilomar Conf. on Circuits, Systems and Computers, Monterey, Calif., 9 Nov. 1981
(Contract DE-AC04-76DP-00789)
(DE82-003048; SAND-81-2541C; CONF-811139-2) Avail: NTIS HC A02/MF A01

This paper introduces an IIR adaptive algorithm based on gradient search techniques which is easily constrained to remain stable during the adaptive process. Using a modified cascade structure, zeros are realized in a direct tapped delay line form while poles are realized as a series of second order sections in cascade. Thus, maintaining stability during the adaptive process is simplified to checking the coefficients of a series of second order polynomials to be sure the roots are within the stable region. DOE

N83-17200# Oak Ridge National Lab., Tenn. Computer Sciences Div.
SOLVING THE PLATEAU PROBLEM IN PARAMETRIC FORM
Alan D. Solomon, Baruch Cahlon (Oakland Univ.), and Louis J. Nachman (Oakland Univ.) Sep. 1982 27 p refs
(Contract W-7405-eng-26)
(DE83-000220; ORNL-CSD-104) Avail: NTIS HC A03/MF A01

A method is presented for the numerical solution of the Plateau problem in parametric form. Specifically, a minimal surface spanning a simple closed curve in 3-dimensional space is sought. If the curve is planar then the problem reduces to that of finding a conformal mapping onto its interior. DOE

N83-17201# Sandia Labs., Albuquerque, N. Mex. Numerical Mathematics Div.
TYPE-INSENSITIVE ODE CODES
L. F. Shampine 1981 16 p refs Presented at the 1st Latin Am. Conf. on Appl. Math., Santiago,
(Contract DE-AC04-76DP-00789)
(DE82-006295; SAND-82-0061C; CONF-811219-1) Avail: NTIS HC A02/MF A01

The numerical solution of the initial value problem is reviewed in the classical situation of Lipschitz constant which is not large, and some aspects of the solution of problems with large Lipschitz constants are considered. It is hoped that the concept of stiffness is clarified by this review. It is shown that it is feasible to write codes which recognize and respond effectively to the type of the problem. The efficiency of such codes is insensitive to the changing of type in the course of an integration. DOE

N83-17202# Gosudarstvennyi Komitet po Ispolzovaniyu Atomnoi Energii, Moscow (USSR). Inst. of Theoretical and Experimental Physics.
SCATTERING INTEGRAL EQUATIONS AND FOUR NUCLEON PROBLEM INTEGRAL EQUATIONS FOR WEINBERG QUASI-PARTICLES
I. M. Narodetsky 1981 75 p refs
(DE82-700203; ITEP-13(1981)) Avail: NTIS (US Sales Only) HC A04/MF A01; DOE Depository Libraries

Existing results from the application of integral technique to the four-nucleon bound states and scattering are reviewed. The purpose of this review is to provide a clear and elementary introduction in the integral equation method and to demonstrate its usefulness in physical applications. The presentation is based on the quasiparticle approach. This permits a simple interpretation of the equation in terms of quasiparticle scattering. The mathematical basis for the quasiparticle approach is the Hilbert-Schmidt method of the Fredholm integral equation theory. The first part contains a detailed discussion of the Hilbert-Schmidt expansion as applied to the two-particle amplitudes which are the kernels of the three-body equations. The second part contains the discussion of the three- and four-body quasiparticle equations. DOE

N83-17203# Los Alamos Scientific Lab., N. Mex.
ERROR ANALYSIS AND UNIQUENESS PROPERTIES OF THE WILSON-FOWLER SPLINE
W. R. Melvin Aug. 1982 27 p refs
(Contract W-7405-eng-36)
(DE82-000459; LA-9178) Avail: NTIS HC A03/MF A01

An alternative algorithm is proposed that is approximately five times faster than the Wilson-Fowler curve fitting algorithm. Furthermore, conditions are set forth that guarantee existence of a solution. When the existence conditions are satisfied, an absolute error bound is also available. Finally, the problem of uniqueness of solutions is analyzed. DOE

N83-17204# Oxford Univ. (England). Engineering Lab.
THE CHOICE AND USE OF NORMAL APPROXIMATIONS TO TRANSFER
R. W. Daniel and B. Kouvaritakis 1982 19 p refs Sponsored by Central Electricity Generating Board and SRC
(OUEL-1424/82) Avail: NTIS HC A02/MF A01

Techniques for obtaining improved normal approximations are proposed and results which for the 2x2 case minimize the approximation error are presented. In the general case of an mxm matrix G(jw), it is shown that the proposed choice for Ga(jw) is better than earlier suggestions in that it leads to a smaller sigma (E(jw)), whereas in the special case of a 2x2 G(jw) the proposed choice for Ga(jw) is shown to be optimal in the sense that it minimizes sigma (E(jw)). Author (ESA)

N83-17205# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
GENERAL RELAXATION SCHEMES IN MULTIGRID ALGORITHMS FOR HIGHER ORDER SINGULARITY METHODS
B. Oskam and J. M. J. Fray 31 Jul. 1981 21 p refs Presented at NASA Symp. on Multigrid Method, Moffett Field, Calif., 21-22 Oct. 1982 Previously announced as N81-33890
(NLR-MP-81047-U) Avail: NTIS HC A02/MF A01

Relaxation schemes based on an approximate and incomplete factorization technique (AF) are presented. With these AF schemes a fast multigrid method for solving integral equations of the second as well as integral equations of the first kind can be constructed. Features include smoothing factors found for integral equations of the first kind, and the comparison with similar results for equations of the second kind. Application of the multigrid algorithm shows convergence to the level of the truncation error of a second order accurate panel method within 2 multigrid cycles. Author (ESA)

N83-17206# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
ON THE FEASIBILITY OF INTERSECTION MATRICES OF TYPE Lm(s,t,c)
C. Roos and A. J. vanZanten 1981 36 p refs
(PB82-251836; Rept-81-02) Avail: NTIS HC A03/MF A01 CSCL 12A

The theory of distance-regular graphs is discussed. This theory was initiated by N. Biggs, and independently by Delsarte, whose so-called metric association schemes are distance regular graphs, in fact. GRA

N83-17207# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
AN ALGORITHM AND IMPLEMENTING SOFTWARE FOR CALCULATING CONVOLUTION INTEGRALS INVOLVING DISTRIBUTIONS WITH A SINGULARITY AT THE ORIGIN
Denis J. McConalogue 1981 52 p refs
(PB82-251828; Rept-81-03) Avail: NTIS HC A04/MF A01 CSCL 12A

An algorithm for numerical convolution of distributions which may have a singularity at the origin is described along with a FORTRAN implementation of the algorithm and listings of the implementing subroutines. In addition to the basic routines, ad hoc routines for use with the basic routines to convolute the exponential, gamma, Weibull, lognormal, inverse Gaussian and truncated normal distributions are described. GRA

N83-17208# Cambridge Univ. (England). Div. of Control and Management Systems.
THE APPLICATION OF GENERALIZED DIAGONAL DOMINANCE TO LINEAR SYSTEM STABILITY THEORY
D. J. N. Limebeer 1982 57 p refs
(PB82-253055; CUED/F-CAMS/TR-222-1982; ISSN-0309-765X) Avail: NTIS HC A04/MF A01 CSCL 12A

A study was made at the generalization of two aspects of Rosenbrock's stability theorems. His diagonal dominance condition was replaced by a less restrictive generalized diagonal dominance condition. Systems which were only generalized block diagonally dominant could be treated using the Nyquist array approach. Theorems were described which were useful for evaluating loop robustness with respect to actuator and sensor gain variations and for analysing the stability of large systems easily decomposed into subsystems for analysis. Interconnected power systems could be treated as individual power stations or turbogenerators. Graphical interpretations were used to facilitate the implementation of the ideas into computer aided design packages. GRA

N83-17209# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
NUMERICAL SOLUTION OF BANG BANG CONTROL PROBLEMS WITH SEQUENTIAL QUASI LINEARIZATION
C. deWit 1982 24 p refs
(PB82-252677; Rept-82-07) Avail: NTIS HC A02/MF A01 CSCL 12A

Dynamic systems with a linear or nearly linear time behavior are addressed. The problems are solved with the method of quasilinearization. The iterating sequence is stopped, as soon as the control has a sufficiently close resemblance to a purely bang bang control. GRA

N83-17210# National Oceanic and Atmospheric Administration, Washington, D. C. National Earth Satellite Service.
NUMERICAL SMOOTHING AND DIFFERENTIATION BY FINITE DIFFERENCES
Henry E. Fleming and Lawrence J. Crone May 1982 32 p refs
(PB82-258385; NOAA-TR-NESS-91; NOAA-82072904) Avail: NTIS HC A03/MF A01 CSCL 12A

General formulae are derived for digital polynomial smoothing and digital polynomial differentiation of data observed at equal abscissa spacings. The operations are performed by a moving fit of polynomials to small overlapping subsets of the data. Results are also derived for the special situation in which the moving fit approaches the boundary of the data set. Brief discussions indicate how the formulae are applied in practical situations and include a description of an error detection and correction technique which is very closely related to smoothing. Author (GRA)

N83-17211# Technische Hogeschool, Delft (Netherlands). Onderafdeling der Wiskunde an Informatica.
ANALYSIS AND COMPARISON OF RELAXATION SCHEMES IN ROBUST MULTIGRID AND PRECONDITIONED CONJUGATE GRADIENT METHODS, EXTENDED VERSION
Rob Kettler 1982 54 p refs
(PB82-262106; Rept-82-17) Avail: NTIS HC A04/MF A01 CSCL 12A

A robust and efficient MG (Multigrid) method based on incomplete Gauss elimination/continuity interpolation to cope with strong inhomogeneities and general domains is discussed along with its use as preconditioning for conjugate gradient methods. Several Gauss-Seidel and incomplete LU relaxation schemes are compared with respect to their smoothing factors and efficiencies. The practical behavior of some of these schemes is compared for three iterative methods and two difficult test problems. GRA

N83-17212# Instituut TNO voor Wiskunde, Informatieverwerking en Statistiek, The Hague (Netherlands).
THE BIPLOT IN MULTIVARIATE ANALYSIS

C. J. F. terBraak Jun. 1981 29 p refs
(PB82-262742) Avail: NTIS HC A03/MF A01 CSCL 12A

The relation is reviewed between biplots and the multivariate techniques principal component analysis, discriminant analysis, and canonical correlation analysis. The emphasis is on the graphical representation of multivariate data by bilinear approximation of matrices with weighted least-squares. GRA

N83-17213# National Bureau of Standards, Washington, D.C.
NORMAL FORM AND REPRESENTATION THEORY Final Report
Richard Cushman, Richard Mosak, and Andre Deprit Jun. 1982 73 p
(PB82-263443; NBSIR-82-2541) Avail: NTIS HC A04/MF A01 CSCL 12A

Representation theory of Lie algebras is called upon to develop a procedure for normalizing a dynamical system with two degrees of freedom in the neighborhood of an equilibrium when the Hamiltonian H(x,y,X,Y) in the coordinates (x,y) and their conjugate momenta (X,Y) is of the type H=((Xsup2)+(Ysup2))/2+V (x,y,X,Y), the potential energy V being a sum of homogeneous polynomials in the phase variables of degree strictly greater than two. The fact that the resulting potential V' is a polynomial in the new coordinates (x',y') and the angular momentum G' = x'Y'-y'X' implies that the normalization is a rotation in the configuration space from a fixed frame to an ideal frame. The technique is intended for normalizing a Hamiltonian in equilibrium at the origin when the Lie derivative associated with the quadratic part is not semi-simple, e.g. the planar Restricted Problem of Three Bodies at the equilateral equilibrium L4 when the basic frequencies are equal (Routh's singular case). GRA

N83-17214# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
ASPECTS OF NUMERICAL METHODS FOR ELLIPTIC SINGULAR PERTURBATION PROBLEMS
A. Segal 1981 48 p refs
(PB82-251612; Rept-81-08) Avail: NTIS HC A03/MF A01 CSCL 12A

Numerical problems related with boundary layers such as occur for example in flows governed by the Navier-Stokes equations are analyzed. Upwind difference, defect correction and central difference schemes for the solution of the convection diffusion equation with small viscosity coefficient are compared. It is shown that central difference schemes and hence also standard Galerkin finite element methods are preferable above upwind and defect correction schemes, when Gaussian elimination is used for the solution of the resulting system of equations. When iterative solution methods are employed good results can be achieved by a defect correction method, whereas upwind difference schemes are generally inaccurate. GRA

N83-17215# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
SOLUTION OF THE STATIONARY BOUSSINESQ EQUATIONS BY FINITE ELEMENT METHODS
A. Segal 1982 14 p refs
(PB82-251620; Rept-82-10) Avail: NTIS HC A02/MF A01 CSCL 12A

Some results of computations on a free convection problem by finite element methods are presented. It is shown that for small Rayleigh numbers, temperature and velocity may be uncoupled during the computation, but that high Rayleigh numbers require a coupled solution method, for example a Newton Raphson technique. GRA

N83-17361*# Alabama Univ., University. Dept. of Mathematics.
CONTROL POLE PLACEMENT RELATIONSHIPS
O. Richard Ainsworth *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 12 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 12A

N83-17386*# Middle Tennessee State Univ., Murfreesboro. Dept. of Mathematics and Computer Science.
POPULATION CONTROL OF SELF-REPLICATING SYSTEMS
Richard L. McCord *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 12 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 12A

N83-17396*# Alabama Univ., Huntsville. Dept. of Mathematics.
A MARKOV CHAIN MODEL FOR RELIABILITY GROWTH AND DECAY
Kyle Siegrist *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 22 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 12A

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N83-17216# North Carolina Univ., Chapel Hill. Dept. of Mathematics.
A CONDITIONED LIMIT LAW RESULT FOR JUMPS IN THE SEQUENCE OF PARTIAL MAXIMA OF A STATIONARY GAUSSIAN SEQUENCE
William P. McCormick Aug. 1982 16 p refs
(Contract F49620-82-C-0009; AF Proj. 2304)
(AD-A120298; AFOSR-82-0844TR; TR-17) Avail: NTIS HC A02/MF A01 CSCL 12/1

Conditional of a jump occurring, the limiting distribution for the size of the jump in the partial maxima sequence for a class of stationary Gaussian sequences is derived. It is shown that the limiting distribution is exponential with mean square root of (1-gamma) where gamma equals the atom at zero of the spectral distribution function associated with the correlation function of the sequence. A generalization of this result to include the entire jump sequence subsequent to the jump conditioned to occur is also presented. GRA

N83-17217# Aerospace Corp., El Segundo, Calif. Guidance and Control Div.
LIMIT THEOREMS FOR EXTREMES IN A PARTICULAR EARMA (1,1) SEQUENCE Final Technical Report
M. R. Chernick 15 Sep. 1982 10 p refs
(Contract F04701-81-C-0082)
(AD-A120612; TR-0082(9990)-5; SD-TR-82-74) Avail: NTIS HC A02/MF A01 CSCL 12/1

Chernick (1980) showed that when the parameter rho in an EARMA (1, 1) sequence is equal to one, the distribution of the maximum term converges to a distribution of the general form given by Galambos (1978). This distribution is not one of the three extreme-value types. In this report the asymptotic joint distribution of the maximum and minimum is obtained using the same conditioning argument as in Chernick (1980). The maximum and minimum are asymptotically independent and the minimum behaves as if the sequence were a collection of independent and identically distributed random variables even though the maximum does not behave as such. The asymptotic distribution for the range and midrange are also obtained. Author (GRA)

N83-17218# Decision Research Corp., Eugene, Oreg.
A SUBJECTIVIST VIEW OF CALIBRATION
Joseph B. Kadane and Sarah Lichtenstein Jul. 1982 39 p refs
(Contract N00014-80-C-0150; NR Proj. 197-064)
(AD-A120554; PTR-1092-82-5) Avail: NTIS HC A03/MF A01 CSCL 14/2

Calibration concerns the relationship between subjective probabilities and the long-run frequencies of events. Theorems from the statistical and probability literature are reviewed to discover the conditions under which a coherent Bayesian expects to be calibrated. If the probability assessor knows the outcomes of all

previous events when making each assessment, calibration is always expected. However, when such outcome feedback is lacking, the assessor expects to be well calibrated on an exchangeable set of events if and only if the events in question are viewed as independent. Although this strong condition has not been tested in previous research, we speculate that the past findings of pervasive overconfidence are not invalid. Although experimental studies of calibration hold promise for the development of cognitive theories of confidence, their value for the practice of probability assessment seems more limited. Efforts to train probability assessors to be calibrated may be misplaced. Author (GRA)

N83-17219# North Carolina Univ., Chapel Hill. Dept. of Statistics.
RESEARCH IN STOCHASTIC PROCESSES Final Report, 1 Feb. - 31 Oct. 1981
Stamatis Cambanis, Raymond J. Carroll, M. Ross Leadbetter, and Gopinath Kallianpur Nov. 1981 39 p refs
(Grant AF-AFOSR-0080-80; AF Proj. 2304)
(AD-A120390; AFOSR-82-0889TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Research was conducted in the following areas: (1) alpha-symmetric multivariate distributions; sampling designs for the detection of signals in noise; asymptotically optimal quantizers; prediction and filtering for certain harmonizable stable processes; exact analysis of two analog-digital-analog systems. Feynman integrals; random fields; nondeterministic random fields and Wold and Halmos decompositions for commuting isometries; filtering theory; application of stochastic differential equations in behavior of neurons and other biological problems. (3) extremes of non-stationary normal sequences; clustering indices for extremes of stationary processes. (4) nondeterministic random fields and Wold and Halmos decomposition for commuting isometries, commuting semigroups of isometries. (5) Feynman integrals. (6) splicing of measures; large deviation theory; the whiete noise approach to likelihood ratios for signals in noise. (7) random designs for estimating integral of stochastic processes; asymptotics. (8) Markov property for Gaussian ultraprocesses; prediction and filtering for certain harmonizable stable processes. (9) robust estimation in heteroscedastic linear models. GRA

N83-17220# California Univ., Livermore. Lawrence Livermore Lab.
DATA MODEL FOR INTEGRATING STATISTICAL INTERPRETATIONS
Rowland R. Johnson 8 Oct. 1981 21 p refs Presented at Workshop on Statist. Data Base Management, Menlo Park, Calif., 2-4 Dec. 1981 Submitted for publication
(Contract W-7405-eng-48)
Avail: NTIS HC A02/MF A01

A problem found in many statistical databases, in particular, in situations where different measurements are based on different partitionings of the same entity is considered. In such a situation a statistical interpretation is required to relate the two measurements. A database model is presented that serves as a framework for representing statistical interpretations. Further, a query language that is based on the model is presented. This query language allows queries to be processed such that the statistical interpretation is integrated in a well defined meaningful way. DOE

N83-17221# Brookhaven National Lab., Upton, N. Y.
ESTIMATING MANY VARIANCES
H. Robins 1981 15 p refs Presented at 3d Purdue Symp. on Statis. Inference, West Lafayette, Ind., 8 Jun. 1981
(Contract DE-AC02-76CH-00016)
(DE82-006936; BNL-30554; CONF-8106199-1) Avail: NTIS HC A02/MF A01

Suppose that an unknown random parameter theta with distribution function G is such that given theta, an observable random variable x has conditional probability density f(x / theta) of known form. If a function t = t(x) is used to estimate theta, then the expected squared error with respect to the random variation of both theta and x is: E(t- theta) squared = integral integral (t(x)-theta) squared (f(x/theta)dx dG(theta). For fixed G we can seek to minimize this equation within any desired class of functions t, such as the class of all linear functions A + Bx, or the class of all Borel functions whatsoever. DOE

N83-17222# Princeton Univ., N. J. Plasma Physics Lab.
DIRECT INTERACTION APPROXIMATION AND STATISTICALLY STEADY STATES OF THREE NONLINEARLY COUPLED MODES
J. A. Krommes 19 Jan. 1982 14 p refs
(Contract DE-AC02-76CH-03073)
(DE82-007676; PPPL-1860) Avail: NTIS HC A02/MF A01

The direct-interaction approximation is used to find statistically steady states of a system of three modes, with complex frequencies, coupled by a quadratic nonlinearity. These states are compared to the exact predictions of an ensemble of realizations with Gaussianly distributed initial conditions. The direct-interaction approximation is shown to be reasonably successful in this context. DOE

N83-17223# Technische Hogeschool, Eindhoven (Netherlands). Measurement and Control Group.
INFORMATION MEASURES AND THEIR APPLICATIONS TO IDENTIFICATION: A BIBLIOGRAPHY
M. F. Ponomarenko, comp. (Kiev Polytech. Inst.) Nov. 1981 29 p refs
(EUT-81-E-123; ISBN-90-6144-123-4) Avail: NTIS HC A03/MF A01

A 300 reference bibliography of probabilistic and nonprobabilistic syntactic information measures, and semantic and pragmatic information measures is presented. Applications of information measures to identification are also covered. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N83-17224# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
CONDITIONED LIMIT THEOREMS FOR WAITING TIME PROCESSES OF THE M/G/1 QUEUE Ph.D. Thesis
G. Hooghiemstra 1982 22 p refs
(PB82-251604; Rept-82-16) Avail: NTIS HC A02/MF A01 CSCL 12B

Functional limit theorems for the actual waiting time process conditioned by the event that the number of customers in a busy period exceeds n or equals n are discussed. Attention is also paid to the actual waiting time process with random time index. Combined with the existing literature on the subject this paper gives a complete account of the conditioned limit theorems for the actual waiting time process of an M/G/1 queue for arbitrary traffic intensity and for a rather general class of service time distributions. The limit processes that occur are Brownian excursion and meander, while in the case of random time index also the following limit occurs: Brownian excursion divided by an independent and uniform (0,1) distributed random variable.
Author (GRA)

N83-17225# Sandia Labs., Albuquerque, N. Mex.
GAME THEORY MODEL OF DIGITAL MESSAGE AUTHENTICATION
Gustavus J. Simmons 1981 12 p Presented at the 11th Conf. on Numerical Math. and Computing, Winnipeg, Manitoba, 26 Oct. 1981
(Contract DE-AC04-76DP-00789)
(DE82-004765; SAND-81-1985C; CONF-8110130-1) Avail: NTIS HC A02/MF A01

The purpose in authenticating digital messages is to give the receiver the ability to assure himself that a message originated with the purported transmitter and that it was not altered in transit. The reason for authentication is that there is assumed to be an

opponent whose objectives are to either impersonate the transmitter and/or modify legitimate messages sent by the transmitter. The competing objectives of these participants are contested in the communications channel, which quite naturally is best modeled as a game. In this paper the essential features of this game theoretic communications channel are formulated and illustrated with small examples. DOE

N83-17226# Technische Hogeschool, Delft (Netherlands). Onderafdeling der Wiskunde en Informatica.
ON TRANSCIENCE AND RECURRENCE OF GENERALIZED RANDOM WALKS
F. M. Dekking 1981 17 p refs
(PB82-251661; Rept-81-20) Avail: NTIS HC A02/MF A01 CSCL 12B

A generalized random walk is a process of partial sums of a stationary and ergodic sequence of random variables. Many results of random walk theory (where the variables are supposed to be independent) carry over to this general setting. The basic definitions and a survey of some of the main results are given. The Peano curve as a generic point for a generalized random walk is discussed. This construction is generalized obtaining a class of generalized random walks which might be called deterministic, as the corresponding dynamical systems have zero entropy. GRA

N83-17227# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
PERFORMANCE EVALUATION OF NON-LINEAR OPTIMIZATION METHODS VIA MULTI-CRITERIA DECISION ANALYSIS AND VIA LINEAR MODEL ANALYSIS
F. A. Lootsma 1981 40 p refs
(PB82-252719; Rept-81-15) Avail: NTIS HC A03/MF A01 CSCL 12B

How Saaty's priority theory for pairwise comparison can be used to evaluate the performance of nonlinear optimization methods is shown. First, priorities are assigned to the predominant performance criteria; generally, robustness, efficiency, capacity, simplicity of use, and program organization. Thereafter, the comparative studies of nonlinear optimization codes are used to assign weights to the methods under each of the performance criteria separately. Here, Saaty's eigenvector method is modified, and logarithmic regression is employed in order to deal with incomplete and multiple pairwise comparisons. The procedure outlines what performance evaluation can do and what it cannot do: it demonstrates how multicriteria decision analysis can be used for an integrated assessment of optimization methods taking into account both the performance criteria of decision makers and the results of comparative studies. Finally, it is shown that efficiency weights can be obtained from these studies by the analysis of variance. Author (GRA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N83-17228# Illinois Univ., Chicago. Dept. of Mathematics, Statistics and Computer Science.
ON THE SUPERADDITIVITY OF INFORMATION MATRICES IN GAUSS-MARKOV MODELS
A. S. Hedayat and Dibyen Majumdar 1982 47 p refs
(Grant AF-AFOSR-0170-80; AF Proj. 2304)
(AD-A120381; AFOSR-82-0891TR) Avail: NTIS HC A03/MF A01 CSCL 09/4

The statistical efficiency of designs associated with the linear model is by and large measured solely on the basis of the information matrices. It is shown that when data from two experiments with the same model, which might contain nuisance parameters, but with possibly different design matrices are combined, then the resulting information matrix is larger (in the sense of nonnegative definiteness) than the sum of the individual information matrices. Cases where equality is achieved are completely characterized geometrically and statistically. Conditions where the best linear unbiased estimator of estimable functions are obtained as linear combination of the best linear unbiased estimators of the same function from the individual experiments are determined. Author (GRA)

N83-17229# California Univ., Santa Barbara. Inst. for the Interdisciplinary Applications of Algebra and Combinatorics.
ON GENERALIZATIONS OF THE PERRON-FROBENIUS THEORUM
Moshe Goldberg (Technion - Israel Inst. of Technology) and E. G. Straus (California Univ., Los Angeles) Sep. 1982 25 p refs
(Grants AF-AFOSR-0127-79; NSF MCS-79-03162; AF Proj. 2304)
(AD-A120254; AFOSR-82-0843TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The Perron-Frobenius Theorem states that a matrix with nonnegative entries has at least one nonnegative eigenvalue of maximal absolute value and a corresponding eigenvector with nonnegative components. We discuss generalizations of this celebrated theorem that locate an eigenvalue of maximal absolute value and the components of a corresponding eigenvector within a certain angle of the complex plane depending on the angle which contains the entries of the matrix. A complete description of the 2 x 2 case as well as partial results for the general case are given. GRA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N83-17230# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
MODELING OF ELECTROKINESIS Final Report, FY 80 - FY 82
James B. Warriner and Perry A. Taylor Sep. 1982 60 p refs
(DA Proj. 4A1-61101-A-91-D)
(AD-A120453; WEX/MP/GL-82-13) Avail: NTIS HC A04/MF A01 CSCL 20/3

Electrokinetic streaming potentials were measured in typical geological materials using specially constructed apparatus to model water flow through subsurface flow paths. The apparatus used for the study is described by this report as are the measurement techniques used. Comparisons between the observed electrokinesis phenomena and theoretical predictions are made. Conclusions resulting from this study include: studies of streaming potentials in typical geological materials should be concentrated in real geological environments; fluid electrical resistivity as influenced by dissolved ion content is more critical to streaming potential measurements than temperature influences and should be measured directly; contrary to the results of past studies of streaming potentials, it was found that metallic electrodes performed more satisfactorily than did nonpolarizable porous pot electrodes; a relationship was observed between the flow rate of the water through the porous media and the electrical surface potential of the solid portion of the media. This relationship may provide a useful application of streaming potential surveys after further development; and the presence of appreciable amounts of clay in or near the water flow path through porous media degrades electrokinetic potential magnitudes and hinders streaming potential measurements. Author (GRA)

N83-17231# Ames Lab., Iowa. Dept. of Physics.
DEVELOPMENT OF IN SITU CONDUCTORS FOR FUSION MAGNETS
D. K. Finnemore and J. D. Verhoeven 1981 9 p refs Presented at the 9th Symp. on Eng. Probl. of Fusion Res., Chicago, 26-29 Oct. 1981
(Contract W-7405-eng-82)
(DE82-004773; IS-M-358; CONF-811040-141) Avail: NTIS HC A02/MF A01

In the design of different types of magnets different features are relatively more important than others so it would be desirable to be able to alter manufacturing processes to tailor make the optimum conductor for each specific application. The basic fabrication options open to the manufacturer and several variations of conductor processing which yield high performance conductors suitable for toroidal fusion magnets are presented. The Nb3Sn-Cu conductor is considered in particular. DOE

N83-17232# Ames Lab., Iowa. Inst. fuer Angewandte Kernphysik I.

VIBRATIONAL FREQUENCIES VIA FROZEN PHONONS

B. N. Harmon, W. Weber, and D. R. Hamann (Bell Labs., Murray Hill, N.J.) 1981 12 p refs Presented at the Intern. Conf. on Phonon Phys., Bloomington, Ind., 31 Aug. - 3 Sep. 1981

(Contract W-7405-eng-82)

(DE82-006256; IS-M-347; CONF-810872-5) Avail: NTIS HC A02/MF A01

A first principles linear combination of atomic orbitals method was used to calculate the total ground state energy for crystals of Si, Nb and Mo involving lattice distortions. From these calculations the equilibrium lattice constant, cohesive energy, and bulk modulus as well as the vibrational frequencies for selected phonons were determined. DOE

N83-17233# Case Western Reserve Univ., Cleveland, Ohio.

THE EFFECT OF AN ELECTRIC FIELD ON ELECTRON ATTACHMENT TO SF6 IN NON-POLAR LIQUIDS

George Bakale and Werner F. Schmidt, ed. (Hahn-Meitner-Inst. fuer Kernforschung Berlin G.m.B.h.) 1981 4 p refs Presented at the 7th Intern. Conf. on Conduction and Breakdown in Dielectric Liquids, Berlin, 27-31 Jul. 1981; sponsored by IEEE Electrical Insulation Soc.

(Contract DE-AS02-78EV-04746)

(DE82-007543; DOE/EV-04746/3; CONF-810734-3) Avail: NTIS HC A02/MF A01

Sulfur hexafluoride is widely used as a gaseous insulator in high voltage equipment which is primarily attributable to the electronegative nature of the SF6 molecule. Due to this property, electrons readily attach to SF6 and potential electron avalanches are thereby quenched. Several reports have been published in which the effect of SF6 on the insulating behavior of transformer oil was investigated and where SF6 was found to influence breakdown at different stages of the discharge. In view of the finding that the electron attachment rate constant, k/sub s/, becomes field dependent in liquid Ar and Xe at fields where u/sub e/ is field dependent, it was of obvious interest to determine if the same phenomena occurred in liquid hydrocarbons. Therefore, the effect of the electric field, F, on k/sub s/, at F = 50 to 200 kV/cm was studied in the two liquids in which detailed field dependent studies of u/sub e/7, 8/ had been made, viz. ethane and propane. Results are presented and discussed. DOE

N83-17234# Bristol Univ. (England). Dept. of Aeronautical Engineering.

A DIGITAL SIMULATION OF FRICTION APPLIED TO A SIMPLE MASS-SPRING DAMPER SYSTEM B.S. Thesis

D. T. Cuong and C. B. A. Young Jun. 1982 61 p refs

(BU-275) Avail: NTIS HC A04/MF A01

In order to validate digital simulation of sliding friction in a mechanical system against a real system, friction was introduced to a mass-spring test rig. An accelerometer provided time response records of acceleration on an ultraviolet strip chart recorder. Comparison of equivalent experimental and simulated runs was based on the release from an initial displacement, and the sinusoidal excitation by displacement input. Good agreement is obtained for all cases, with the classical response shapes usually associated with friction being observed. The main discrepancies in matched results are due to difficulties in accurately measuring the actual friction values existing in the experimental runs.

Author (ESA)

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N83-17235* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SOUND SHIELD Patent

Theodore R. Creel, Jr. and Ivan E. Beckwith, inventors (to NASA) Issued 28 May 1981 7 p Filed 28 May 1981 Supersedes N81-39138 (19 - 20, p 2729)

(NASA-Case-LAR-12883-1; US-Patent-4,363,237; US-Patent-Appl-SN-267935; US-Patent-Class-73-147) Avail: US Patent and Trademark Office CSCL 20A

An improved test section for a supersonic or hypersonic wind tunnel is disclosed wherein the model tested is shielded from the noise normally radiated by the turbulent tunnel wall boundary layer. A vacuum plenum surrounds spaced rod elements making up the test chamber to extract some of the boundary layer as formed along the rod elements during a test to thereby delay the tendency of the rod boundary layers to become turbulent. Novel rod construction involves bending each rod slightly prior to machining the bent area to provide a flat segment on each rod for connection with the flat entrance fairing. Rods and fairing are secured to provide a test chamber incline on the order of 1 deg outward from the noise shield centerline to produce up to 65% reduction of the root mean square (rms) pressure over previously employed wind tunnel test sections at equivalent Reynolds numbers.

Official Gazette of the U.S. Patent and Trademark Office

N83-17236*# College of William and Mary, Newport News, Va.

NOISE MEASUREMENTS FOR SINGLE AND MULTIPLE OPERATION OF 50 KW WIND TURBINE GENERATORS

Harvey H. Hubbard and Kevin P. Shepherd Dec. 1982 28 p refs Prepared in cooperation with Bionetics Corp., Hampton, Va.

(Contract NAS1-14970; Grant NAG1-166)

(NASA-CR-166052; NAS 1.26:166052) Avail: NTIS HC A03/MF A01 CSCL 20A

The noise characteristics of the U.S. Windpower Inc., 50 kw wind turbine generator were measured at various distances from 30 m to 1100 m and for a range of output power. The generated noise is affected by the aerodynamic wakes of the tower legs at frequencies below about 120 Hz and the blade trailing edge thickness at frequencies of about 2 kHz. Rope strakes and airfoil fairings on the legs did not result in substantial noise reductions. Sharpening the blade trailing edges near the tip was effective in reducing broad band noise near 2 kHz. For multiple machines the sound fields are superposed. A three-fold increase in number of machines (from 1 to 3) results in a predicted increase in he sound pressure level of about 5 dB. The detection threshold for 14 machines operating in a 13 - 20 mph wind is observed to be at approximately 1160 m in the downwind direction. Author

N83-17237*# Stanford Univ., Calif. Joint Inst. for Aeronautics and Acoustics.

EFFECTS OF FLIGHT ON NOISE RADIATED FROM CONVECTED RING SOURCES IN COAXIAL DUAL FLOW. PART 2: THE NOISE FROM HEATED JETS

R. Dash Aug. 1982 53 p refs

(Contract NCC2-75)

(NASA-CR-169736; NAS 1.26:169736; SU-JIAA-TR-48-Pt-2) Avail: NTIS HC A04/MF A01 CSCL 20A

The effects of flight on noise from heated jets are discussed. The effects of the additionally, extraneously-generated dipole and simple source terms which arise as a result of the density gradients across the fluid interfaces were incorporated. The coaxial flows with inverted profiles are shown to be quieter than the conventional profiles; however, the benefit of noise reduction at higher outer-to-inner area ratios is totally offset as the inverted profile incurs a significant massloss and thrust-loss. Amongst all the possible coaxial configurations when on of the coaxial streams is heated-conventional profile (CP), inverted profile (IP) and the variable stream control engine (VSCE) cycle-and at constant massflow and

thrust, a VSCE-cycle is the most desirable and the best possible engine cycle inasmuch as it provides over more than 18.0 dB reduction in SPL (as compared against noise from a CP-cycle) at all angles, both statically and in flight, for area ratios Sigma < 0.25. Author

N83-17238*# Stanford Univ., Calif. Joint Inst. for Aeronautics and Acoustics.
EFFECTS OF NOISE RADIATED FROM CONVECTED RING SOURCES IN COAXIAL DUAL FLOW. PART 1: THE NOISE FROM UNHEATED JETS
R. Dash Aug. 1982 58 p refs
(Contract NCC2-75)
(NASA-CR-169737; NAS 1.26:169737; SU-JIAA-TR-48-Pt-1) Avail: NTIS HC A04/MF A01 CSCL 20A

The effects of flight on sound radiated from embedded, uncorrelated ring sources convecting along the midst of the primary and the secondary streams of a coaxial dual flow which emerges from a moving nozzle into the ambience are studied. Cold jets are examined. The problem is posed as a double vortex-sheet flow model which involves deliberate suppression of inherent instabilities of the flow and is formulated, as a linear problem, in terms of the combined contributions of two independent uncorrelated quadrupole-type ring sources, the one convecting in the primary flow representing the sources generated due to the interaction at the primary/secondary interface and the other convecting in the secondary flow representing the sources generated due to the interaction at the secondary/ambient interface. The analysis shows that the effects of flight induce (1) amplication of noise in the forward quadrant, (2) reduction of noise in the aft quadrant and (3) absolutely no impact on radiation of noise at Theta = 90 deg to the jet axis. Author

N83-17239*# Kentron Technical Center, Hampton, Va.
COMPARISON OF FORWARD FLIGHT EFFECTS THEORY OF A. MICHALKE AND U. MICHEL WITH MEASURED DATA Final Report
John W. Rawls, Jr. Washington NASA Jan. 1983 53 p refs
(Contract NAS1-16000)
(NASA-CR-3665; NAS 1.26:3665) Avail: NTIS HC A04/MF A01 CSCL 20A

The scaling laws of a Michalke and Michel predict flyover noise of a single stream shock free circular jet from static data or static predictions. The theory is based on a farfield solution to Lighthill's equation and includes density terms which are important for heated jets. This theory is compared with measured data using two static jet noise prediction methods. The comparisons indicate the theory yields good results when the static noise levels are accurately predicted. Author

N83-17240*# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
AN EVALUATION OF SPACE SHUTTLE STS-3 PAYLOAD BAY ACOUSTIC DATA AND COMPARISON WITH PREDICTIONS
John F. Wilby, Allan G. Piersol, and Emma G. Wilby Sep. 1982 82 p refs
(Contract NAS5-26570)
(NASA-CR-170465; NAS 1.26:170465; BBN-4959) Avail: NTIS HC A05/MF A01 CSCL 20A

Acoustic data inside the payload bay and over the exterior of the orbiter were collected. The data were used to evaluate the Payload Acoustic Environment for Shuttle (PACES) computer program. Author

N83-17241*# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
AN EVALUATION OF SPACE SHUTTLE STS-3 PAYLOAD BAY ACOUSTIC DATA AND COMPARISON WITH PREDICTIONS
John F. Wilby, Allan G. Piersol, and Emma G. Wilby Sep. 1982 81 p refs
(Contract NAS5-26570)
(NASA-CR-170470; NAS 1.26:170470; Rept-4959) Avail: NTIS HC A05/MF A01 CSCL 20A

Acoustic data collected inside the payload bay and over the exterior of the orbiter collected during the third launch (STS 3) were analyzed and evaluated. Author

N83-17242*# Garrett Turbine Engine Co., Phoenix, Ariz.
COMPUTER PROGRAM TO PREDICT NOISE OF GENERAL AVIATION AIRCRAFT: USER'S GUIDE Final Report
J. A. Mitchell, C. K. Barton, L. S. Kisner, and C. A. Lyon Sep. 1982 281 p refs
(Contract NAS3-23037)
(NASA-CR-168050; NAS 1.26:168050; Garrett-21-4270-2) Avail: NTIS HC A13/MF A01 CSCL 20A

Program NOISE predicts General Aviation Aircraft far-field noise levels at FAA FAR Part 36 certification conditions. It will also predict near-field and cabin noise levels for turboprop aircraft and static engine component far-field noise levels. Author

N83-17243# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
INTELLIGIBILITY, PRIVACY AND NOISE IN CONVENTIONAL AND OPEN OFFICES
L. X. Nepomuceno 10 Dec. 1982 28 p refs In PORTUGUESE; ENGLISH summary
Avail: NTIS HC A03/MF A01

The most important physical phenomena associated with the design of conventional and open offices are described. The work is the main goal of the presentation, therefore physical acoustics, architectural acoustics, pychoacoustics and factors concerning the furniture and equipment used in offices are considered. The importance of background noise on privacy, and the economical implications that modern techniques have are discussed. S.L.

N83-17244# Texas Univ., Austin. Applied Research Labs.
THE RISE TIME OF N WAVES PRODUCED BY SPARKS M.S. Thesis
Lori Beth Orenstein 5 Oct. 1982 131 p refs
(Contract N00014-75-C-0867)
(AD-A120817; ARL-TR-82-51) Avail: NTIS HC A07/MF A01 CSCL 20/1

The rise time of spark produced N waves in air has been measured with a microphone of very wide bandwidth. The purpose was to determine the extent to which vibrational relaxation affects the rise time. Electric sparks having energies between 0.06 J and 26.5 J were used. The N waves had pressure amplitudes in the range 0.15-15.0 mbar, half durations 7.5-41.5 microsec, and rise times 0.65-7.0 microsec. The measurements were taken at source-receiver distances of 0.1-5.5 m. Data were taken under three different conditions: constant spark energy, constant half duration, and constant amplitude. Theoretical predictions in common use for the rise time of a plane step shock in a thermoviscous gas and in a relaxing gas were reviewed. The measurements show, however, that these predictions are not really applicable to the head shock of our spherical N waves. An alternative theoretical prediction was obtained by using a computer algorithm to predict the waveform of a propagating N wave. The algorithm includes finite amplitude distortion, spherical spreading, absorption based on the ANSI standard for still air, and dispersion appropriate for oxygen relaxation. The predicted waveforms, including amplitude, half duration, and rise time, are in good agreement with the measured waveforms. Further computer calculations show that the measured rise times cannot be attributed to relaxation (including dispersion) or thermoviscous absorption alone. Both mechanisms are important for the N waves in our experiment. Author (GRA)

N83-17245# Texas Univ., Austin. Applied Research Labs.
PRELIMINARY RESULTS OF AN EVALUATION OF THE EFFICIENCY OF VLP SEISMIC PROPAGATION IN A CONTINENTAL SLOPE ENVIRONMENT Final Report, 2 Mar. 1981 - 1 Mar. 1982
Paul J. Vidmar 6 Aug. 1982 9 p refs
(Contract N00014-81-K-0353)
(AD-A120339; ARL-TR-82-36) Avail: NTIS HC A02/MF A01 CSCL 20/10

Data collected in a continental slope geometry were used to investigate the efficiency of low frequency bottom penetrating propagation. Preliminary ray trace and bottom los modeling were used to estimate the duration of the water-borne component of shot data and to identify shots containing potential sediment penetrating arrivals. Frequency band analysis of the time series of a shot was used to confirm the identification of a subbottom penetrating arrival on the basis of its loss of high frequency energy due to absorption within the subbottom. Propagation loss, estimated using the theoretical source spectrum, was used to compare low frequency propagation along a subbottom path to high frequency propagation along a waterborne path. This comparison showed that for a source in deep water and a bottomed receiver on the continental slope, the efficiency of 35 Hz bottom penetrating propagation is comparable to, if not better than, propagation along a waterborne path over the 35-1000 Hz frequency range studied. Author (GRA)

N83-17246# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biodynamic Environment Branch.
USAF ENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 150: C-140 IN-FLIGHT CREW NOISE
Harald K. Hille Sep. 1982 18 p refs
(AF Proj. 7231)
(AD-A120508; AMRL-TR-75-50-Vol-150) Avail: NTIS HC A02/MF A01 CSCL 01/2

The C-140 is a USAF transport aircraft used for operational support. This report provides measured data defining the bioacoustic environments at flight crew/passenger locations inside this aircraft during normal flight operations. Date are reported for seven locations in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, USAF Bioenvironmental Noise Data Handbook, Vol. 1: Organization, Content and Application, AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. GRA

N83-17247# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biodynamic Environment Branch.
USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 152: C-12A IN-FLIGHT CREW NOISE
Harald K. Hille Sep. 1982 18 p refs
(AF Proj. 7231)
(AD-A120509; AMRL-TR-75-50-Vol-152) Avail: NTIS HC A02/MF A01 CSCL 01/2

The C-12A is a military version of the Beechcraft Super King Air 200. This report provides measured data defining the bioacoustic environments at flight crew/passenger locations inside this aircraft during normal flight operations. Data are reported for five locations in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application, AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. GRA

N83-17248# Tennessee Univ., Knoxville. Ultrasonics Lab.
EFFECT OF NONPARALLELISM ON THE MEASUREMENT OF ULTRASONIC ATTENUATION IN SOLIDS MS Thesis. Interim Report
Joseph Pierre Serge Boudreault Sep. 1982 117 p refs
(Contract N00014-81-K-0229)
(AD-A119817) Avail: NTIS HC A06/MF A01 CSCL 20/14

Evaluation of attenuation of ultrasonic waves in solids from pulse echo trains can be complicated by a number of factors. In this report one considers the effects of diffraction and nonparallelism of the sample surfaces in the linear approximation. A mathematical model for correcting the echo height for the effect of a wedge-shaped sample is constructed. By using a unique coordinate system, the path of a multiply-reflected ultrasonic wave is transformed into an equivalent unidirectional path. A diffraction correction then is applied by numerically integrating an improved version of the farfield solution to the diffraction integral. This model is used to interpret data taken on a steel plate which as different facets ground over a range of angles between 0 and 0.01175 radians. Plots are given of corrected attenuation measurements made with circular piezoelectric transducers having resonance frequencies between 3 and 7 MHz. A comparison is made between the present model and that of Truell and Oates (J. Acoust. Soc. Am. 35, (1963)), which was intended as an indicator of the necessity for applying a correction for nonparallelism. The present model corrects the first four echoes for frequencies $f < 6$ MHz and angles gamma $<$ or $=$ 4 x 10 to the minus 3rd power radians. GRA

N83-17249# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
ENVIRONMENTAL NOISE LEVELS AT THE SVU AND MOD-2 WIND TURBINE TEST SITES AT WPRS, MEDICINE BOW, WYOMING
H. E. McKenna and C. Etter Aug. 1982 98 p refs
(Contract DE-AC02-77CH-00178)
(DE82-020991; SERI/TR-635-1069) Avail: NTIS HC 05/MF A01

To document the overall effect of wind turbines on the acoustic environment, data identifying preinstallation acoustic sources and their associated levels present at wind turbine sites must be obtained. These environmental noise levels can then be used when the wind turbines are installed, as a reference to assess the overall impact of the wind turbines on the acoustic environment. The environmental sound levels at the Department of Interior's Water and Power Resources Services Wind Turbine Test Sites at Medicine Bow, Wyoming, in October 1980 are presented and analyzed. Typical of undeveloped rural areas, the sound levels recorded during the nighttime hours are 10 dB(A) below those recorded during the daytime. The two Wind Turbine Test Sites studied are described as quiet for the time period studied. DOE

N83-17250# Ames Lab., Iowa.
INVERSION OF ULTRASONIC SCATTERING DATA
James H. Rose (California Univ., Livermore, Lawrence Livermore Lab.) and J. L. Opsal 1981 8 p refs Presented at the AF/DARPA Rev. of Progress in Quantitative NDE, Boulder, Colo., 2-7 Aug. 1981
(Contract W-7405-eng-82)
(DE82-004809; IS-M-359; CONF-810839-7) Avail: NTIS HC A02/MF A01

The elastic wave inverse scattering problem is examined from the point of view of the inverse Born approximation (IBA). It is shown that the IBA yields highly accurate results for the shape of complex composite voids given sufficient scattering data. The IBA is shown to provide accurate determinations for the size and shape of simple cracks and for a composite flaw which consists of a void with a circumferential crack. The Born approximation is also shown to provide a means for determining the composition of inclusions. DOE

N83-17251# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
EFFECTS OF SURFACE MAPPING CORRECTIONS WITH SYNTHETIC-APERTURE FOCUSING TECHNIQUES ON ULTRASONIC IMAGING
B. A. Barna and J. A. Johnson 1981 8 p refs Presented at the AF/DARPA Rev. of Progr. in Quantitative NDE, Boulder, Colo., 2-7 Aug. 1981
(Contract DE-AC07-76ID-01570)
(DE82-006270; EGG-M-06981; CONF-810839-8) Avail: NTIS

HC A02/MF A01

Image processing to improve the resolution of ultrasonic imaging systems requires an accurate knowledge of the geometry and properties of the media through which the ultrasound travels. This is particularly true when a method such as the Synthetic Aperture Focusing Technique (SAFT) is used. For SAFT to function properly, it is necessary to accurately know the path traveled by the ultrasound from transducer to target and back again. A form of SAFT imaging is described in which the image routine also constructs a map of the target surface. This map is then used to accurately calculate the propagation history of the ultrasound for the SAFT processing. The resolution and positional accuracy of unprocessed images, unmapped SAFT images, and surface mapping SAFT images are compared. All but the surface mapping images show significant errors in positional accuracy for relatively small surface deviations. DOE

N83-17252# Institute of Gas Technology, Chicago, Ill.
IDENTIFICATION OF LEAKS: INTERNAL ACOUSTIC TECHNIQUE Final Report, Nov. 1980 - Jan. 1982
J. E. Huebler, N. C. Saha, and J. M. Craig Aug. 1982 89 p refs
(Contract GRI-80/0143; IGT Proj. 30541)
(PB82-262536; GRI-5080-352-0359) Avail: NTIS HC A05/MF A01 CSCL 21D

A sensitive microphone was used inside of a simulated low-pressure gas main to determine the feasibility of detecting, pinpointing, typing, and sizing small leaks in gas distribution systems. Spectral analysis over the frequency range of 0 to 100,000 Hz was used to obtain information about the leak signals. Findings indicate that leaks can be detected at pressures as low as 2 inches of water column (0.072 psi) or at flow rates less than 2 SCF/h. Leaks can be pinpointed to within plus or minus 6 inches, and several types of soil conditions around the pipe have minimal effects on the detectability of the leak signals. Characteristic spectra of simulated leak types as well as comparison of these spectra to simple models are also given. The effects of pipe diameter and the position of the microphone in the main are also discussed. GRA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N83-17253# Naval Research Lab., Washington, D. C.
EQUILIBRIUM OF A HIGH CURRENT ELECTRON RING IN A MODIFIED BETATRON ACCELERATOR
C. A. Kapetanakos, P. Sprangle, D. P. Chernin, and I. Haber 30 Sep. 1982 72 p refs
(RR011094E)
(AD-A119869; NRL-MR-4905) Avail: NTIS HC A04/MF A01 CSCL 20/7

This paper addresses the dynamics of an ultra-high current electron ring in a modified betatron configuration. Our studies include analytical and numerical results for both cold and hot rings. It has been found that the walls surrounding the ring and toroidal effects (hoop stresses) play a very important role in the dynamics of the ring, even when the wall conductivity is infinite. For finite wall conductivity, the diffusion of the ring's self magnetic field profoundly impacts its dynamics in general the equilibrium could be lost if means are not provided to compensate for this effect. In addition, it has been found that the Grad B drift is not important, except when he bounce frequency is very small. The general conclusion of these studies is that equilibrium states of ultra-high current rings in a modified betatron configuration exist over a wide range of parameters. These states are accessible and within the realm of existing pulsed power technology. GRA

N83-17254# New York Univ., New York. Dept. of Physics.
HEAVY PARTICLE COLLISIONS
Larry Spruch and Robin Shakeshaft 1982 10 p refs
(Contracts N00014-76-C-0317; N00014-77-C-0553; Grants NSF PHY-79-10413; NSF PHY-81-19010)
(AD-A120349) Avail: NTIS HC A02/MF A01 CSCL 20/8

This report discusses nuclear resonances and the probability of K-shell ionization, effect of collisions on the emission of radiation, and asymmetric charge transfer. GRA

N83-17255# Arizona Univ., Tucson. Optical Sciences Center.
TIME-OF-FLIGHT SPECTROSCOPY OF IONIC AND METASTABLE FRAGMENTS FROM DISSOCIATING MOLECULES Annual Technical Report, 15 Jun. 1981 - 14 Jun. 1982
Willis E. Lamb, Jr., K. C. Hsieh, and L. C. McIntyre, Jr. 8 Sep. 1982 9 p refs
(Grant AF-AFOSR-0218-80; AF Proj. 2301)
(AD-A120512; AFOSR-82-0912TR) Avail: NTIS HC A02/MF A01 CSCL 20/7

Progress is reported on research in molecular physics involving electron-bombardment molecular dissociation. The velocity distribution of metastable and ionic fragments are measured using a pulsed electron beam and a time-of-flight technique. During the past year, experiments involving detection of ionic fragments from the hydrogen halides and acytelene have been underway. The velocity spectrum of protons resulting from dissociation of the hydrogen halides show several distinct features, and attempts are presently being made to assign these features to particular molecular states. Measurements to determine electron bombardment threshold energies for these features have been made and should help in confirming such assignments. Several different ionic fragments have been detected from the dissociation of acytelene. A mass filter is used in these experiments to obtain velocity spectra of each mass species separately. Author (GRA)

N83-17256# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HIGH-CURRENT PULSED ELECTRON ACCELERATOR Annual Report
28 Jul. 1982 12 p refs Transl. into ENGLISH of report Institute of Atomic Energy (China), 1979 p 58-62
(AD-A120582; FTD-IS(RS)T-1718-81) Avail: NTIS HC A02/MF A01 CSCL 20/7

The physical layout and engineering design of a high current pulsed electron accelerator are addressed. The principal criteria for the accelerator are given along with the main parameters of the impulse voltage generator and the water medium, double layer coaxial tramsmission line. A schematic diagram of the impulse voltage generator is shown and overall performance of the generator is discussed. Electric field calculations of a Blumlein transmission line were undertaken. Results are discussed. J.M.S.

N83-17257# Williams Coll., Williamstown, Mass. Dept. of Physics and Astronomy.
RESONANCE STUDIES OF HYDROGEN ATOMS INTERACTING WITH VERY COLD SURFACES Annual Summary Report, 1 Mar. 1982 - 28 Feb. 1983
Stuart B. Crampton 8 Oct. 1982 5 p refs
(Contract N00014-80-C-0240)
(AD-A120475; SBCONR3) Avail: NTIS HC A02/MF A01 CSCL 20/7

Techniques and information developed during previous studies of the ground state hyperfine resonance of hydrogen atoms intermittently absorbed on molecular hydrogen surfaces are applied to the development of a state-selected low temperature hydrogen beam. Beam intensities up to 5 x 10 to the 13th power sec-1 of F=1, mF=0 atoms are achieved and used to study hydrogen atom interactions near 4.2 K. Modifications for extending the temperature range are designed and made. GRA

N83-17258# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
CHARGED PARTICLE DISTRIBUTIONS AND ELECTRIC FIELD MEASUREMENTS TAKEN BY S3-3
Paul F. Mizera, Joseph F. Fennell, Donald R. Croley, Jr., and David J. Gorney 1 Oct. 1982 42 p refs
(Contract F04701-82-C-0083)

(AD-A120562; TR-0083(3940-05)-1; SD-TR-82-71) Avail: NTIS HC A03/MF A01 CSCL 20/7

Comparisons of electron and proton distribution functions are made with DC electric field measurements as the S3-3 satellite crossed a series of high latitude acceleration regions near local dusk on July 29, 1976. Potential drops from parallel electric fields are inferred from charged particle distributions using adiabatic theory and compared with potentials calculated from measured perpendicular electric fields. There exists a one-to-one spatial relationship between strong DC electric field enhancements in the form of electric field reversals and acceleration signatures of auroral particles. From the charged particle and electric field analysis, we conclude that electric fields, parallel to B, can extend above and below the satellite altitude near 7500 km when strong electrostatic field reversals are encountered. Within the uncertainties of our analysis, the potential drop below the satellite is comparable to the potential calculated from the individual electrostatic structures crossed by the satellite. There are, in addition, particle signatures that imply a source of strong acceleration was located above and relatively close to the satellite. These accelerated electrons are coincident with auroral hiss and ion conics. GRA

N83-17259# SRI International Corp., Menlo Park, Calif. Chemistry Lab.

MULTIPHOTON DYNAMICS: ENERGY DISPOSAL DURING DECOMPOSITION OF MOLECULES UNDER STATIC, VERY LOW-PRESSURE, AND MOLECULAR-BEAM CONDITIONING, SPECIFIC RATE CONSTANTS, AND DISTRIBUTION FUNCTIONS Final Report, 12 May 1978 - 15 May 1982

Alan C. Baldwin, Michel Rossi, David M. Golden, and John R. Barker 14 Jul. 1982 24 p refs

(Contract F49620-78-C-0107; AF Proj. 2303; SRI Proj. 7433)

(AD-A120469; AFOSR-82-0892TR) Avail: NTIS HC A02/MF A01 CSCL 20/8

The objective of this research is to increase the understanding of the chemical dynamics of multiphoton processes. The work covers both experimental and theoretical research into both photophysical and photochemical aspects of multiphoton phenomena. The specific tasks of the project are to: Study the chemical dynamics of multiphoton processes in a series of prototype molecules under static conditions; and to Study the chemical dynamics of multiphoton processes in prototype molecules under very low-pressure flow conditions, measuring yields under varying conditions. GRA

N83-17260# Wisconsin Univ., Madison. Dept. of Physics.

COLLISIONAL EXCITATION AND RADIATION OF ATOMS AND MOLECULES Annual Technical Report, 1 Jul. 1981 - 30 Jun. 1982

Chun C. Lin 24 Aug. 1982 4 p

(Grant AF-AFOSR-3649-78; AF Proj. 2301)

(AD-A120513; AFOSR-82-0913TR) Avail: NTIS HC A02/MF A01 CSCL 20/8

The general objectives of this research project are to study collisional excitation of atoms and molecules and the radiation emitted by these excited atoms and molecules. For the 7/81-6/82 period our major efforts include (1) electron excitation of the xenon atom, (2) electron excitation of the nitrogen molecules, (3) a new technique for measuring electron excitation of metastable levels of atoms, (4) excitation of sodium atom by negative-ion impact. Author (GRA)

N83-17261# Florida State Univ., Tallahassee.

ENERGY TRANSFORMATION IN MOLECULAR ELECTRONIC SYSTEMS Progress Report, 1 Dec. 1980 - 30 Nov. 1981

Michael Kasha 30 Nov. 1981 5 p

(Contract DE-AS05-78EV-05855)

(DE81-028043; DOE/EV-05855/4) Avail: NTIS HC A02/MF A01

Research summarized includes singlet oxygen research, excited-state proton-transfer studies (7-azaindole, hydrosyflavones, chromones, luminol), and solvent cage studies. DOE

N83-17262# Carnegie-Mellon Univ., Pittsburgh, Pa.

KAON FACTORY SCATTERING AT MEDIUM ENERGIES

R. A. Eisenstein 1981 18 p refs Presented at TRIUMF Kaon Factory workshop, Aug. 1981

Avail: NTIS HC A02/MF A01

A brief review of kaon-nucleus scattering is given. The discussion includes an account of recent theoretical interpretations of existing elastic and inelastic data, as well as possible directions for future study. The current experimental facility at Brookhaven is described, and an outline of future progress in his area is presented. Author

N83-17263# Fermi National Accelerator Lab., Batavia, Ill.

PRODUCTION OF CHARM AND NEW PARTICLES IN NEUTRINO-NUCLEON INTERACTIONS

H. Eugene Fisk Nov. 1981 28 p refs Presented at the 1981 Intern. Symp. on Lepton and Photon Interactions at High Energies, Bonn, 24-29 Aug. 1981

(Contract DE-AC02-76CH-03000)

(DE82-004472; FERMILAB-CONF-81/73-EXP) Avail: NTIS HC A03/MF A01

The current experimental status of charm production by neutrinos is reviewed. Results on like sign dimuons are also discussed. DOE

N83-17264# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.

BEAM-INDUCED PRESSURE VARIATIONS IN A TFTR NEUTRAL-BEAM INJECTOR

James E. Willis and Klaus H. Berkner Oct. 1981 5 p refs Presented at the 9th Symp. on Eng. Probl. of Fusion Res., Chicago, 26-29 Oct. 1981

(Contract W-7405-eng-48)

(DE82-004561; LBL-13597; CONF-811040-139) Avail: NTIS HC A02/MF A01

When a neutral beam is switched on, ions from the plasma source, which used to contribute to the gas flow, are converted to an energetic beam and are pumped away: hence reducing the gas input to the neutralizer. The large volume of the neutralizer and its high conductance damp out rapid changes; for example, when the gas to the source is first turned on, there is a 230 msec exponential rise time associated with pressure in the neutralizer. The neutralizer in turn acts as a source of gas to the first chamber and the first chamber to the second and so on. Beam dumps become additional sources of gas in the second chamber and target tank as gas molecules are collisionally desorbed from the surface of the dump. An analytical model (the equivalent of an electrical RC circuit) of the volumes and conductances of the system was used to describe the pressure variations. The use of time dependent sources terms in the model gives an estimate of the desorption rate from the dumps and its time variation during a beam pulse. DOE

N83-17265# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.

PERFORMANCE CHARACTERISTICS OF NBSTF, THE PROTOTYPE NEUTRAL-BEAMLINE FOR TFTR

K. H. Berkner, J. H. Feist, V. L. Jacobson, A. F. Lietzke, J. W. Roberts, R. R. Smith, A. Wekhof, and J. E. Willis Oct. 1981 5 p refs Presented at the 9th Symp. on Eng. Probl. of Fusion Res., Chicago, 26-29 Oct. 1981

(Contract W-7405-eng-48)

(DE82-004843; LBL-13506; CONF-811040-137) Avail: NTIS HC A02/MF A01

The neutral beam system test facility (NBSTF), a shielded facility for prototype development and testing of the multi-megawatt neutral-beam injection system for the Tokamak fusion test reactor (TFTR), includes: a power system capable of regulated, rapidly switched 120-kV, 75-A, 1.5-sec pulses every three minutes; the cryopumped TFTR prototype beamline with calorimeter, sweep magnet, ion dump, duct, and a target calorimeter; and a computer controls and diagnostic system. Beam-diagnostic systems are described. Beam operation at 120 kV, 65 A, 0.8 sec was achieved

with a molecular-ion mixture of 60% D(+)/30% D2(+)/10% D3(+). Limited operations with an improved plasma source yielded 80% D(+)/15%D2(+)/15%D3(+) at 120 kV, 67A, 0.5 sec. The estimated 120-keV D(0) power delivered with twelve ion sources to TFTR is 17 +/-2 MW for the standard plasma source and 22 +/-4 MW for the improved source. DOE

N83-17266# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.

PULSED COOLING-WATER SYSTEMS FOR ACTIVELY COOLED BEAM DUMPS

J. A. Paterson, M. Fong, S. Moon, P. Purgalis, and R. P. Wells Oct. 1981 5 p ref Presented at the 9th Symp. on Eng. Probl. of Fusion Res., Chicago, 26-29 Oct. 1981

(Contract W-7405-eng-48)

(DE82-004559; LBL-13514; CONF-811040-138) Avail: NTIS HC A02/MF A01

A pulsed water system offers an economically attractive way of supply cooling water for beam dumps, as the water flow and pressure requirements increase. A pilot system was built and used in testing prototype beam dumps. Operating experience gained with the pulsed water system has proved the feasibility of this design. DOE

N83-17267# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.

SPUTTERING-EROSION ESTIMATES FOR NBETF BEAM DUMPS

A. Wekhof and K. H. Berkner Oct. 1981 4 p refs Presented at the 9th Symp. on Eng. Probl. of Fusion Res., Chicago, 26-29 Oct. 1981

(Contract W-7405-eng-48)

(DE82-004558; LBL-13515; CONF-811040-133) Avail: NTIS HC A02/MF A01

To stop multisecond high energy hydrogen or deuterium beams in neutral injection systems, thin skin actively cooled dumps made of Cu, Mo, or W are contemplated. The design goal for the life of the beam dumps is 25,000 thirty second pulses, with a fluence of 10 to the 23rd power deuterons sq cm. An erosion allowance of 0.13 cm for Cu, 0.02 cm for Mo, and 0.004 cm for W is estimated for incorporation in the beam dump design. DOE

N83-17268# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.

THE DESIGN OF MULTI-MEGAWATT ACTIVELY COOLED BEAM DUMPS FOR THE NEUTRAL-BEAM ENGINEERING TEST FACILITY

J. A. Paterson, G. Koehler, and R. P. Wells Oct. 1981 6 p refs Presented at the 9th Symp. on Eng. Probl. of Fusion Res., Chicago, 26-29 Oct. 1981

(Contract W-7405-eng-48)

(DE82-004567; LBL-13516; CONF-811040-134) Avail: NTIS HC A02/MF A01

To test neutral beam sources up to 170 keV, 65 Amps, with 30 second beam on times, actively cooled beam dumps for both the neutral and ionized particles are required. The dumps should be able to dissipate a wide range of power density profiles by utilizing a standard modular panel design which is incorporated into a moveable support structure. The thermal hydraulic design of the panels permit the dissipation of 2 kW/sq cm anywhere on the panel surface. The water requirements of the dumps are optimized by restricting the flow to panel sections where the heat flux falls short of the design value. The mechanical design of the beam-dump structures is described along with tests performed on two different panel designs. The dissipation capabilities of the panels were tested at the critical regions to verify their use in the beam dump assemblies. DOE

N83-17269# General Atomic Co., San Diego, Calif.

MECHANICAL PROPERTIES CONSIDERATIONS FOR USE OF EPOXY INSULATORS AND BONDED JOINTS IN NEUTRAL BEAM ION SOURCES

D. W. Doll, P. W. Trester, and H. G. Staley Oct. 1981 6 p Presented at the 9th Symp. on Eng. Probl. of Fusion Res., Chicago, 26-29 Oct. 1981

(Contract DE-AT03-80SF-11512)

(DE82-006961; GA-A-16549; CONF-811040-143) Avail: NTIS HC A02/MF A01

In the Doublet III (D-III) neutral beam injectors, cast, rigid epoxy insulators are joined to the AISI 304 stainless steel corona rings with semirigid epoxy adhesive. Selected mechanical properties of these materials were measured between 11 C and 65 C, well below the material temperature limits, to identify the trends and to confirm adequate mechanical strength for the insulators. Significant creep deformation was measured at 22 C. Empirical relationships were developed to predict long term strain over a range of stress and temperature of design interest. Delayed failure was observed in bonded specimens at stress levels well below the ultimate strength. In order to protect the D-III neutral beam ion source epoxy from elevated temperature effects, a chill was installed in the cooling water circuit. Outgassing measurements of the insulator epoxy were made and found to be low and primarily H2O. DOE

N83-17270# Los Alamos Scientific Lab., N. Mex.

NUMERICAL STUDY OF THE EFFECTS OF SPACE CHARGE ON PERIODIC FOCUSING

P. M. Lapostolle 1981 27 p refs Transl. into ENGLISH of "Etude Numerique d'Effets de Charge d'Espace en Focalisation Periodique" rept. CERN-ISR/78-13 Organisation Europeene pour la Recherche Nucleaire, France, 1978

(Contract W-7405-eng-36)

(DE82-001575; LA-tr-81-27; CERN-ISR/78-13) Avail: NTIS HC A03/MF A01

Filamentation effects entailing emittance growth due to space charge in the transport of intense beams have been studied by numerical simulation. Programs tested on calculable cases in continuous focusing systems show for high intensities, in the case of periodic focusing and according to the periodicity, either instability-type phenomena appearing at intensities below the thresholds so far known or progressive, though slow, and regular growths of emittance, which allow more intense beams to be transported over moderate distances. At low intensities, emittances remain constant. No detailed theoretical interpretation of these results is proposed. DOE

N83-17271# California Univ., Livermore. Lawrence Livermore Lab.

HIGH FRAME-RATE NEUTRON RADIOGRAPHY OF DYNAMIC EVENTS

R. H. Bossi, A. H. Robinson (Oregon State Univ., Corvallis), and J. P. Barton 20 Nov. 1981 10 p refs Presented at the World Conf. on Neutron Radiography, San Diego, Calif., 7-10 Dec. 1981

(Contract W-7405-eng-48)

(DE82-004389; UCRL-86594; CONF-811215-1) Avail: NTIS HC A02/MF A01

A system was developed to perform neutron radiographic analysis of dynamic events having a duration of several milliseconds. The system is operated in the range of 2000 to 10,000 frames/second. Synchronization provided high speed motion neutron radiographs for evaluation of the firing cycle of 7.62 mm munition rounds within a steel rifle barrel. The system was also used to demonstrate the ability to produce neutron radiographic movies of two phase flow. The equipment uses the Oregon State University TRIGA reactor capable of pulsing to 3000 MW peak power, a neutron beam collimator, a scintillator neutron conversion screen coupled to an image intensifier, and a 16 mm high speed movie camera. The peak neutron flux incident at the object position is approximately 4 x 10 to the 11th power n/sq cm with a pulse full width at half maximum, of 9 ms. The scintillator conversion screens and on the effects of statistical limitations on the image quality were studied and modulation transfer function analysis was used to assist in the evaluation of the system performance. DOE

N83-17272# Los Alamos Scientific Lab., N. Mex.
PARTICLE-BEAM ACCELERATORS FOR RADIOTHERAPY AND RADIOISOTOPES
T. J. Boyd, K. R. Crandall, R. W. Hamm, L. D. Hansborough, R. F. Hoeberling, R. A. Jameson, E. A. Knapp, D. W. Mueller, J. M. Potter, and R. H. Stokes 1981 13 p refs Presented at the 15th Japan Conf. on Radioisotopes, Tokyo, 26-27 Nov. 1981
(Contract W-7405-eng-36)
(DE82-004335; LA-UR-81-3329; CONF-811153-1) Avail: NTIS HC A02/MF A01

The philosophy used in developing the PIGMI (pion generator for medical irradiation) technology was that the parameters chosen for physics research machines are not necessarily the right ones for a dedicated therapy or radioisotope machine. In particular, the beam current and energy can be optimized, and the design should emphasize minimum size, simplicity and reliability of operation, and economy in capital and operating costs. A major part of achieving these goals lay in raising the operating frequency and voltage gradient of the accelerator, which shrinks the diameter and length of the components. Several other technical innovations resulted in major system improvements. One of these is a radically new type of accelerator structure named the radio frequency quadrupole accelerator. This allowed the elimination of the large, complicated ion source used in previous ion accelerators, and a very high quality accelerated beam. Also, by using advanced permanent magnet materials to make the focusing elements, the system becomes much simpler. Other improvements are described. DOE

N83-17273# Los Alamos Scientific Lab., N. Mex.
POLARIZATION RESEARCH AND FACILITIES AT LAMPF
M. W. McNaughton 1981 11 p refs Presented at the Intern. Symp. on Polarization Phenomena at High Energies, Dubna, USSR, 17-20 Nov. 1981
(Contract W-7405-eng-36)
(DE82-004370; LA-UR-81-3401; CONF-811147-1) Avail: NTIS HC A02/MF A01

Facilities for spin correlation and spin transfer measurements from 300 to 800 MeV with all (N,S,L) spin directions are described and a program being pursued in several beam lines simultaneously is discussed. Elastic pp measurements at a few energies are making good progress but polarized neutron experiments are lagging. DOE

N83-17274# Stanford Linear Accelerator Center, Calif. Dept. of Physics.
COMPARISON OF WEAK INTERACTION THEORY WITH EXPERIMENT
Stanley G. Wojcicki Oct. 1981 29 p refs Presented at the Meeting of the Div. of Particles and Fields of the Am. Phys. Soc., Santa Cruz, Calif., 9-11 Sep. 1981
(Contract DE-AC03-76SF-00515)
(DE82-005272; SLAC-Pub-2837; CONF-810986-9) Avail: NTIS HC A03/MF A01

The status of charged currents was neutral current reactions is discussed. Glashow-Iliopoulos-Maiani model, extension to 6 quarks, and CP violation, are also considered. DOE

N83-17275# Stanford Linear Accelerator Center, Calif.
MICROWAVE MEASUREMENTS OF ENERGY LOST TO LONGITUDINAL MODES BY SINGLE ELECTRON BUNCHES TRAVERSING PERIODIC STRUCTURES
J. W. Wang, (Tsinghua Univ., Beijing, China), G. A. Loew, J. N. Weaver, J. N. Weaver, and P. B. Wilson Oct. 1981 3 p refs Presented at the Linear Accelerator Conf., Santa Fe, N. Mex., 19-23 Oct. 1981
(Contract DE-AC03-76SF-00515)
(DE82-005076; SLAC-Pub-2830; CONF-811083-16) Avail: NTIS HC A02/MF A01

It is important to minimize the loss of beam energy due to the excitation of higher order modes in the accelerator structure by single bunches of electrons or positrons. This loss is not only detrimental in itself but also gives rise to energy spectrum widening and transverse emittance growth. Microwave measurements made on disk-loaded and alternating spoke structures to determine the loss to the longitudinal modes are described. In these measurements the Gaussian bunch is simulated by a current pulse of the same shape transmitted through the structure on an axial center conductor. Results to date are presented for the total longitudinal loss parameter per period K in volts per picocoulomb. DOE

N83-17276# Stanford Linear Accelerator Center, Calif.
A CID THERMIONIC GUN SYSTEM
R. F. Koontz Oct. 1981 3 p refs Presented at the 1981 Linear Accelerator, Santa Fe, N. Mex., 19-23 Oct. 1981
(Contract DE-AC03-76SF-00515)
(DE82-005080; SLAC-Pub-2824; CONF-811083-14) Avail: NTIS HC A02/MF A01

A high current thermionic gun was installed on the CID injector and brought into operation. The gun and pulser system generate three nanosecond pulses of about six amps peak which, when bunched in the subharmonic buncher system, produce in excess of 10 to the 11th power electrons in a single S band accelerated bunch. Preliminary operation of the gun is described, and details of the avalanche cathode drive pulser are presented. DOE

N83-17277# Los Alamos Scientific Lab., N. Mex.
THE 30-kV PROTON INJECTOR FOR PIGMI
R. W. Hamm, D. W. Mueller, and R. G. Sturgess 1981 5 p refs Presented at 1981 Linear Accelerator Conf., Sant Fe, N. Mex., 19-21 Oct. 1981 Sponsored in part by National Cancer Inst.
(Contract W-7405-eng-36)
(DE82-006125; LA-UR-81-3053; CONF-811083-22) Avail: NTIS HC A02/MF A01

A 30 kV proton injector designed for matching a 31 mA proton beam into the radio frequency quadrupole (RFQ) section of the PIGMI (pion generator for medical irradiation) accelerator was constructed and tested. This injector uses a small efficient duoplasmatron ion source and a single gap extraction system for creating a convergent ion beam, and a three element unipotential einzel lens for focusing the ion beam into the RFQ. A description of this prototype injector is presented, along with the experimental data obtained during the testing of the system. DOE

N83-17278# Brookhaven National Lab., Upton, N. Y.
PHASE TRANSITIONS AND ELEMENTARY-PARTICLE PHYSICS
Michael Creutz 1981 12 p refs Presented at the 9th Midwest Solid State Theory Symp. on Melting, Localization and Chaos, Argonne, Ill., 2-3 Nov. 1981
(Contract DE-AC02-76CH-00016)
(DE82-005502; BNL-30432; CONF-811172-1) Avail: NTIS HC A02/MF A01

The reason physicists are intensely interested in the statistical mechanics of certain lattice models is reviewed. Phase transitions in these systems are of direct relevance to whether the gauge theory of interacting quarks and gluons can prevent the quark from appearing as a free isolated object. Monte Carlo simulation techniques have given the strongest evidence for the confinement phenomenon and are beginning to make numerical predictions in strong interaction physics. DOE

N83-17279# Atomic Energy Research Establishment, Harwell (England). Theoretical Physics Div.
RYDBERG ATOMS
P. T. Greenland Jun. 1981 35 p refs
(DE82-700074; AERE-R-9986) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

This report discusses the major features of Rydberg states in atoms. Particular emphasis is laid on the dipole matrix element for transitions from Rydberg to core states and analytic formulae for dipole matrix elements are obtained. These formulae are checked against the known matrix elements in alkali metal isoelectronic sequences. The formalism is extended to complex atoms where U serves as an example, and it is found that perturbation of Rydberg series by valence states is important. A

nomogram for the calculation of Rydberg to core dipole matrix elements, field ionization thresholds and ionization rates is constructed. DOE

N83-17280# Japan Atomic Energy Research Inst., Tokyo. Div. of Physics.

IONIZATION CROSS SECTIONS FOR ION-ATOM AND ION-MOLECULE COLLISIONS. PART 1: IONIZATION CROSS SECTIONS FOR H+, H2+, H3+, He++ INCIDENT ON H, H2, AND He

Masao Sataka (Tokyo Inst. of Technology), Toshizo Shirai, Akira Kikuchi (Ibaraki Univ.), and Yohta Nakai Feb. 1981 65 p refs (DE82-700079; JAERI-M-9310) Avail: NTIS (US Sales Only) HC A04/MF A01; DOE Depository Libraries

A survey was made systematically of the literature up to the end of 1980. A compilation is presented of experimental ionization cross sections in graphs and tables together with a list of references. DOE

N83-17281# Los Alamos Scientific Lab., N. Mex.

E2 ISOVECTOR GIANT RESONANCE AS SEEN THROUGH THE CAPTURE OF FAST NEUTRONS

D. M. Drake, K. Aniol (British Columbia Univ.), I. Halpern (Washington Univ.), S. Joly (Centre d'Etudes de Bruyeres-le-Chatel), L. Nilsson (Uppsala Univ.), D. Storm (British Columbia Univ.), and S. A. Wender Nov. 1981 6 p refs

(Contract W-7405-eng-36)

(DE82-007357; LA-9026) Avail: NTIS HC A02/MF A01

The forward-to-backward asymmetry of high-energy photons, emitted in the radiative capture of neutrons with energies up to 20 MeV, was measured for 208Pb. The asymmetry increases abruptly from small values to large ones near E gamma approximately 23 MeV, supporting the location in that neighborhood of the E2 giant isovector resonance. DOE

N83-17282# Oak Ridge National Lab., Tenn. Engineering Physics Div.

MONTE CARLO ANALYSIS OF A TIME-DEPENDENT NEUTRON AND SECONDARY GAMMA-RAY INTEGRAL EXPERIMENT ON A THICK CONCRETE AND STEEL SHIELD

S. N. Cramer and R. W. Roussin Nov. 1981 29 p refs

(Contract W-7405-eng-26)

(DE82-002488; ORNL/TM-7972) Avail: NTIS HC A03/MF A01

A Monte Carlo analysis of a time-dependent neutron and secondary gamma-ray integral experiment on a thick concrete and steel shield is presented. The energy range covered in the analysis is 15-2 MeV for neutron source energies. The multigroup MORSE code was used with the VITAMIN C 171-36 neutron-gamma-ray cross-section data set. Both neutron and gamma-ray count rates and unfolded energy spectra are presented and compared, with good general agreement, with experimental results. DOE

N83-17283# California Univ., Berkeley. Lawrence Berkeley Lab. Nuclear Science Div.

ANGULAR MOMENTUM AND LINEAR MOMENTUM TRANSFER IN INTERMEDIATE-ENERGY HEAVY-ION REACTIONS

G. J. Wozniak, C. C. Hsu, D. J. Morrissey, L. W. Richardson, and L. G. Moretto Nov. 1981 21 p refs Presented at the 14th Masurian School of Nucl. Phys., Mikolajki, Poland, 31 Aug. - 12 Sep. 1981

(Contract W-7405-eng-48)

(DE82-005762; LBL-13637; CONF-8108114-1) Avail: NTIS HC A02/MF A01

In order to explore the changing role of angular momentum transfer to the heavy target-like fragment in heavy-ion reactions, the gamma-ray multiplicities associated with projectile residues were measured in the reaction of (2)Ne with (181)Ta in the energy range of 7.5 to 42 MeV/nucleon. From the gamma ray multiplicities, the intrinsic spin of the target-like nucleus was determined and corrected for the spin removed by evaporated particles. Comparisons of the measured intrinsic spin with that expected from the missing linear momentum were found to be good at low energies but failed around a bombarding energy of 17 MeV/nucleon. From the results it is inferred that angular momentum and therefore linear momentum is being carried away in significant amounts by particles which were not detected. DOE

N83-17284# Florence Univ. (Italy). Cattedra di Radiologia.

DIRECT EFFECT OF DIAGNOSTIC ULTRASOUND ON GENETICALLY INTERESTING MOLECULES

Stefano Ciatti, Gabor Domokos, Susan Koevesi-Domokos, and Franco Milano (Servizio di Fisica Sanitaria USL) 1981 7 p refs Presented at the 10th L. H. Gray Conf., Oxford, 13 Jul. 1981 Prepared in cooperation with Johns Hopkins Univ., Baltimore

(Contract DE-AS02-76ER-03285)

(DE82-007136; DOE/ER-03285/42; CONF-810782-1) Avail: NTIS HC A02/MF A01

Ultrasound is a nonionizing radiation and at typical intensities used in diagnostic sonography, macroscopic damage to tissues is negligible. Some recent experiments, however, provided evidence for possible genetic damage caused by relatively low intensity ultrasound irradiation. Although the implications of such experiments concerning possible genetic damage caused by low intensity ultrasound irradiation are not yet completely understood, the very existence of such results raises an important theoretical question. Is is possible that a nonionizing radiation can cause significant changes in the structures of a typical DNA molecule. Several mechanisms exist which are responsible for such changes including: (1) structural changes in the molecule due to sound absorption from a high harmonic of the repetition frequency of a pulsed ultrasound radiation; (2) structural changes due to multiphonon absorption from low harmonics of the repetition frequency; and (3) break up of the molecule as a consequence of the excitation of collective vibrations. DOE

N83-17382*# University of Eastern Kentucky, Richmond. Dept. of Physics and Astronomy.

STUDIES OF NEUTRON AND PROTON NUCLEAR ACTIVATION IN LOW-EARTH ORBIT

C. E. Laird *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 16 p refs (For primary document see N83-17359 07-80)

Avail: NTIS HC A99/MF A01 CSCL 20H

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N83-17285# California Univ., Livermore. Lawrence Livermore Lab.

LAWRENCE LIVERMORE NATIONAL LABORATORY TWO-STAGE LIGHT-GAS GUN

A. C. Mitchell, W. J. Nellis, and R. J. Trinor 23 Oct. 1981 4 p refs Presented at APS Conf. on Shock Waves in Condensed Matter, Menlo Park, Calif., 23-25 Jun. 1981 Submitted for Publication

(Contract W-7405-eng-48)

(DE82-003323; UCRL-86843; CONF-810864) Avail: NTIS HC A02/MF A01

The APS conference on shock waves in condensed matter was held at Menlo Park, Ca, USA on 23 June 1981. The diagnostics and experimental program of a facility used to study condensed matter at high pressures are described. L.F.M.

N83-17286# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.

SOLIDIFICATION OF SAVANNAH RIVER PLANT HIGH LEVEL WASTE

R. Maher, L. F. Shafranek, J. A. Kelley, and R. W. Zeyfang Nov. 1981 17 p Presented at the Am. Nucl. Soc. Meeting, San Francisco, 30 Nov. - 4 Dec. 1981

(Contract DE-AC09-76SR-00001)

(DE82-005221; DPSPU-81-30-10; CONF-811103-66) Avail: NTIS HC A02/MF A01

Authorization for construction of the Defense Waste Processing Facility (DWPF) is expected in FY-83. The optimum time for stage 2 authorization is about three years later. Detailed design and construction will require approximately five years for stage 1, with stage 2 construction completed about two to three years later. Production of canisters of waste glass would begin in 1988, and the existing backlog of high level waste sludge stored at SRP would be worked off by about the year 2000. Stage 2 operation could begin in 1990. The technology and engineering are ready for construction and eventual operation of the DWPF for immobilizing high level radioactive waste at Savannah River Plant (SRP). Proceeding with this project will provide the public, and the leadership of this country, with a crucial demonstration that a major quanitity of existing high level nuclear wastes can be safely and permanently immobilized. DOE

N83-17287# Oak Ridge National Lab., Tenn. Industrial Safety and Applied Health Physics Div.

RADIOLOGICAL ASSESSMENT OF RADIOACTIVE WASTE-DISPOSAL AREAS AT OAK RIDGE NATIONAL LABORATORY. VOLUME 3: TECHNICAL BACKGROUND INFORMATION FOR THE ORNL ENVIRONMENTAL AND SAFETY REPORT

T. W. Oakes, W. F. Ohnesorge, E. B. Wagner, and M. Y. Chaudhry Dec. 1981 40 p refs

(Contract W-7405-eng-26)

(DE82-004556; ORNL/TM-7962-Vol-3) Avail: NTIS HC A03/MF A01

Thermoluminescent dosimeters (TLDs) were used to determine dose equivalent rates in the ORNL solid waste disposal areas. The dosimeters were exchanged and read approximately quarterly during 1979 and 1980. The data were reviewed to detect trends in dose equivalent rates, but no trends were detected other than increased radiation levels in some areas due to the lowering of White Oak Lake. The rates at the disposal site were compared with TLD readings taken in areas on the DOE reservation perimeter, as well as in remote areas that represent natural background for East Tennessee. DOE

N83-17288# Battelle Pacific Northwest Labs., Richland, Wash.

LEACHING BEHAVIOR OF GLASS CERAMIC NUCLEAR WASTE FORMS

R. O. Lokken Nov. 1981 72 p refs

(Contract DE-AC06-76RL-01830)

(DE82-005595; PNL-4022) Avail: NTIS HC A04/MF A01

Glass ceramic waste forms were investigated as alternatives to borosilicate glasses for the immobilization of high-level radioactive waste. Three glass ceramic systems were investigated, including basalt, celsian, and fresnoite, each containing 20 wt percent simulated high-level waste calcine. Static leach tests were performed on seven glass ceramic materials and one parent glass (before recrystallization). Samples were leached at 90 C for 3 to 28 days in deionized water and silicate water. The results, expressed in normalized elemental mass loss, show comparable releases from celsian and fresnoite glass ceramics. Basalt glass ceramics demonstrated the lowest normalized elemental losses with a nominal release less than 2 grams per square meter when leached in polypropylene containers. The releases from basalt glass ceramics when leached in silicate water were nearly identical with those in deionized water. The overall leachability of celsian and fresnoite glass ceramics was improved when silicate water was used as the leachant. DOE

N83-17289# Rockwell International Corp., Richland, Wash. Energy Systems Group.

EXISTING DATA ON THE 216-Z LIQUID WASTE SITES

K. W. Owens May 1981 136 p refs

(Contract DE-AC06-77RL-01030)

(DE82-005758; RHO-LD-114) Avail: NTIS HC A07/MF A01

Disposal structures associated with Z Plant received liquid waste from plutonium finishing and reclamation, waste treatment and laboratory operations. The nineteen 216-Z sites received 83% of the plutonium discharged to 325 liquid waste facilities at the Hanford Site. In support of the Hanford Defense Waste Environmental Impact Statement, existing data are being drawn together for the 216-Z liquid waste disposal sites. Compilation of existing data is the first step in evaluating the need and developing the technology for long-term management of these waste sites. Data describing the status of the 216-Z waste sites as of December 31, 1979 are presented. Information and sketches are taken from existing documents and drawings. DOE

N83-17290# Sandia Labs., Albuquerque, N. Mex.

PREDICTIONS OF RADIONUCLIDE MIGRATION RATES FOR A SUBSEABED REPOSITORY

L. H. Brush 1981 16 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16 Nov. 1981

(Contract DE-AC04-76DP-00789)

(DE82-004763; SAND-81-1380C; CONF-811122-37) Avail: NTIS HC A02/MF A01

Data from studies of high temperature interactions between sediments and porewater (seawater), and of sorption and diffusion of radionuclides in oxidized, deep sea sediments were used, along with results from heat transfer studies, to predict migration rates of radionuclides in a subseabed repository. Preliminary results for most radionuclides in oxidized sediments are very encouraging fission products with moderate values of K/sub D/ and actinides with high values of K/sub D/ would not migrate significant distances before decaying to innocous concentrations. Cs137, Sr90, and Pu239 are among this group. The results for anionic species are less encouraging, but preliminary work with reduced sediments indicates that Tc can be effectively isolated. Planning for a field verification of these laboratory and modeling studies is also described. DOE

N83-17291# Oak Ridge National Lab., Tenn.

GEOGRAPHIC FACTORS RELATED TO SITE SUITABILITY OF LOW-LEVEL WASTE DISPOSAL

H. E. Zittel 1981 7 p ref Presented at the Symp. on Low-Level Waste Disposal. 1: Site Suitability Requirements, Arlington, Va., 8 Dec. 1981

(Contract W-7405-eng-26)

(DE82-006793; CONF-811218-1) Avail: NTIS HC A02/MF A01

Factors related to the site suitability of low level waste disposal sites are discussed including those which might be considered environmental and those dealing with site criteria. Possible population criteria, alternative site selection, transportation criteria, and community involvement are considered. All these factors are based on the premise that the technology exists to carry out low level waste disposal in a manner such that public health and safety can be insured. It is concluded that problems encountered in siting low level waste facilities are largely societal and political in nature. DOE

N83-17292# Oak Ridge National Lab., Tenn.

GAIN FROM A MIXED FINITE-DIFFERENCE FORMULATION FOR THREE-DIMENSIONAL DIFFUSION-THEORY NEUTRONICS

D. R. Vondy and T. B. Fowler 1981 5 p refs Presented at the Am. Nucl. Soc. Winter Meeting, San Francisco, 29 Nov. - 4 Dec. 1981

(Contract W-7405-eng-26)

(DE82-003971; CONF-811103-48) Avail: NTIS HC A02/MF A01

The advantage of a mixed differencing scheme for representing the diffusion theory approximation to neutron transport in three dimensional triangular Z geometry is demonstrated for a fast reactor. Most of the early codes employed the mesh edge difference formulation as is used in the German D3E code. A mesh centered formulation was chosen for use on a routine basis with mesh points located at the centers of the finite difference elements instead of at the corners where the internal material interfaces intersect, the VENURE code being the latest to use this scheme. Results are presented for a fast reactor core problem modeling hexagonal assemblies. DOE

N83-17293# TRIUMF, Vancouver (British Columbia).
HYPERNUCLEAR PHYSICS Progress Report
A. Gal Aug. 1981 10 p refs
(DE82-901342; TRI-PP-81-48) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

Developments in lambda hypernuclear structure are reported in light of recent studies of the (K,pi) reaction, particularly on (13)C. The smallness of the A nucleus spin orbit potential and the appreciable degree of coherence involved in the forward (A)A(K,pi) (A)sub lambda Z reaction are discussed, suggesting a generalization in the former case and a breakdown in the latter case for sigma hypernuclei. Specifically, it is argued that the coherence generally expected in low momentum transfer production of sigma hypernuclei may substantially deteriorate, because a strong spin and isospin dependence of the sigma N interaction are likely to lead to a considerable energy spread of the (K,pi) strength with occasionally large energy shifts for some states. Finally, several observations are made on widths of sigma hypernuclear states. Further implications of the selectivity to the spin isospin level structure argued for sigma hypernuclear widths are suggested in (3)He and (4)He. DOE

N83-17294# California Univ., Livermore. Lawrence Livermore Lab.
ON THE GEOTECHNICAL MODELING OF HIGH-LEVEL NUCLEAR WASTE DISPOSAL BY ROCK MELTING
Francois E. Heuze Dec. 1981 56 p refs
(Contract W-7405-eng-48)
(DE82-007913; UCRL-53183) Avail: NTIS HC A04/MF A01

A new strategy was developed for the geotechnical modeling of nuclear waste disposal by rock melting (DRM). Three separate tasks were performed to reach this objective: a review of the four scenarios which were proposed for DRM, to date; an evaluation of computer-based numerical models which could be used to analyze the mechanical, thermal, and hydraulic processes involved in DRM; and a critical review of rock mass properties which are relevant to the design and safety of waste disposal by rock melting. It is concluded that several geotechnical aspects of DRM can be studied realistically with current state-of-the-art model capabilities and knowledge of material properties. The next step in the feasibility study of DRM should be a best-estimate calculation of the four cavity-melt and canister-burial concepts. These new analyses will indicate the most critical areas for subsequent research. DOE

N83-17295# Pacific Northwest Lab., Richland, Wash.
DEVELOPMENT OF STANDARD TESTING METHODS FOR NUCLEAR-WASTE FORMS
J. E. Mendel and R. D. Nelson Nov. 1981 26 p refs Presented at the ANS Winter Meeting, San Francisco, 29 Nov. - 4 Dec. 1981
(Contract DE-AC06-76RL-01830)
(CONF-811103-67) Avail: NTIS HC A03/MF A01

Testing methods to determine the chemical durability radiation stability, thermal stability, and mechanical properties of nuclear waste forms are described. DOE

N83-17296# Pacific Northwest Lab., Richland, Wash.
STANDARD TESTS FOR THERMAL STABILITY OF NUCLEAR WASTE FORMS
W. J. Weber, W. J. Gray, and R. P. May Oct. 1981 8 p ref Presented at the Intern. Symp. on the Sci. Basis for Nucl. Waste Management, Boston, 16-19 Nov. 1981
(Contract DE-AC06-76RL-01830)
(DE82-005232; PNL-SA-9649; CONF-811122-41) Avail: NTIS HC A02/MF A01

Three test methods have been proposed for evaluating the thermal stability of nuclear waste forms. The time temperature dependence of thermally activated phase transformations are measured by the proposed MCC-7 Recommended Practice for Testing Thermal Phase Stability in Radioactive Waste Forms. The proposed MCC-8 High Temperature Vaporization Test Mehod measures the vaporization of fission products and other condensable elements. The potential pressurization of a canister at elevated temperatures is determined by the proposed MCC-9 Thermal Gas Generation Test Method. These three test methods are described in detail and the results of applying the MCC-7 test method to PNL 78-157 waste glass are presented. DOE

N83-17297# Pacific Northwest Lab., Richland, Wash.
A COMPARATIVE ASSESSMENT OF TRU WASTE FORMS AND IMMOBILIZATION PROCESSES
W. A. Ross, C. O. Harvey, R. O. Lokken, R. P. May, F. P. Roberts, C. L. Timmerman, R. L. Treat, and J. H. Westsik, Jr. Oct. 1981 9 p refs Presented at the Symp. on Sci. Basis for Nucl. Waste Management, Boston, 16-20 November 1981
(Contract DE-AC06-76RL-01830)
(DE82-005231; PNL-SA-9654; CONF-811122-42) Avail: NTIS HC A02/MF A01

Six alternative TRU waste forms and seven waste immobilization processes are comparatively assessed on the basis of both product properties and process costs and risks. The waste forms are characterization for their leachability, mechanical strength, and thermal and radiation stability. The processes are evaluated in terms of costs (for processing, transportation, and repository disposal) and in terms of occupational exposure, industrial hazard, and quality assurance. Cast cement is recommended for immobilization of defense TRU wastes. A glass system, either borosilicate or aluminosilicate, is recommended for immobilization of commercial TRU wastes. DOE

N83-17298# Oak Ridge National Lab., Tenn.
LANTHANIDE ORTHOPHOSPHATES AS A MATRIX FOR SOLIDIFIED RADIOACTIVE DEFENSE AND REACTOR WASTES
M. Petek, M. M. Abraham, and L. A. Boatner 1981 7 p refs Presented at the Mater. Res. Soc. Intern. Symp., Boston, 16-19 Nov. 1981 Submitted for publication
(Contract W-7405-eng-26)
(DE82-004060; CONF-811122-45) Avail: NTIS HC A02/MF A01

Lanthanum phosphate is a promising host material for reprocessed light water reactor wastes (e.g., PW-4b). This is demonstrated by the high density of the composite waste form and by the low leach rates of both Cs and Sr. Additionally, crystallographic data on LaPO4 pellets loaded with 10 wt% simulated PW-4b indicate the presence of only one phase, i.e., monoclinic monazite. The rare-earth orthophosphates have also been shown to be a viable waste form for Savannah River (SRW) defense wastes. Compaction and sintering studies indicate that the rare-earth phosphate mixture employed here is preferable to pure LaPO4 for containing SRW. Higher density and more homogeneous samples were obtained by using the mixed phosphates as compared to pure LaPO4 as the host material. It is shown that aluminum removal from the composite SRW is not necessary when incorporating this type of waste into a rare-earth phosphate host. The current results support the view that lanthanide orthophosphate waste forms (i.e., monazite) are potentially superior to borosilicate glasses. DOE

N83-17299# Pacific Northwest Lab., Richland, Wash.
WEST VALLEY DEMONSTRATION PROJECT: ALTERNATIVE PROCESSES FOR SOLIDIFYING THE HIGH-LEVEL WASTES
L. K. Holton, ed., D. E. Larson, W. L. Partain (Sage Technical Associates, Richland, Wash.), and R. L. Treat Oct. 1981 303 p refs
(Contract DE-AC06-76RL-01830)
(DE82-000936; PNL-3608-1) Avail: NTIS HC A14/MF A01

Two pretreatment approaches and several waste form processes for radioactive wastes were selected for evaluation. The two waste treatment approaches were the salt/sludge separation process and the combined waste process. Both terminal and interim waste form processes were studied. DOE

N83-17300# Rockwell International Corp., Richland, Wash. Basalt Waste Isolation Project.
DEVISING A GROUNDWATER MONITORING STRATEGY FOR A GEOLOGIC REPOSITORY FOR RADIOACTIVE WASTE
Leo S. Leonhart, Frank A. DeLuca, N. Thomas Sheahan (Brown and Caldwell Consulting Engineers, Pasadena, Calif., and

Lawrence M. West (Brown and Caldwell Consulting Engineers, Seattle, Wash.) 1981 55 p refs Presented at the 1st Groundwater Monitoring Symp., Columbus, Ohio, 29 May 1981
(Contract DE-AC06-77RL-01030)
(DE82-000782; RHO-BWI-SA-121; CONF-8105118-1) Avail: NTIS HC A04/MF A01

A topical treatment of the subject of groundwater monitoring as it relates to the particular needs of high-level nuclear waste disposal facilities using the Basalt Waste Isolation Project (BWIP) as a specific reference is presented. While the involvement with management of high-level radioactive wastes and the design and operation of repository facilities is presently parochial to the federal government and certain prime contractors, it is believed that the technical aspects involved with this groundwater monitoring example provide an interesting comparison with those encountered at near-surface and underground-injection, hazardous waste disposal operations. In particular, the integration of several program facets ranging from baselining parameters to validation of predictive models into a comprehensive strategy may be of interest. It is hoped that this type of conceptual exchange will be beneficial to all concerned. DOE

N83-17301# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
PRELIMINARY CALCULATIONS FOR TESTING A FISSION/FUSION HYBRID BLANKET MODULE IN A FISSION REACTOR: ADDENDUM 1
J. L. Judd Dec. 1981 20 p refs
(Contract DE-AC07-76ID-01570)
(DE82-010260; EGG-PHYS-5615-Add-1) Avail: NTIS HC A02/MF A01

Calculations were performed with one dimensional S/sub n/ transport theory to determine heating rates, tritium breeding, and fertile reaction rates of a fission/fusion hybrid blanket concept utilizing uranium as the fertile material. The results are compared with results of previous calculations using thorium as the fertile material. The calculations were done with ANISN using the EPR coupled 121 group cross section library and the MACKLIB-IV compilation of response functions. The heating rate profiles of the hybrid blanket containing thorium is similar to the profile calculated for a hybrid blanket containing uranium. The tritium breeding rate in the thorium case is 4% higher than the uranium case, while the fertile fission and capture rates are lower by 64 and 16%, respectively. DOE

N83-17302# Battelle Nortwest Labs., Richland, Wash.
SURVEY OF SYSTEMS SAFETY ANALYSIS METHODS AND THEIR APPLICATION TO NUCLEAR WASTE MANAGEMENT SYSTEMS
P. J. Pelto, W. K. Winegardner, and R. H. V. Gallucci Nov. 1981 114 p refs
(Contract DE-AC06-76RL-01830)
(DE82-005594; PNL-4072) Avail: NTIS HC A06/MF A01

This report reviews system safety analysis methods and examines their application to nuclear waste management systems. The safety analysis methods examined include expert opinion, maximum credible accident approach, design basis accidents approach, hazard indices, preliminary hazards analysis, failure modes and effects analysis, fault trees, event trees, cause consequence diagrams, GO methodology, Markov modeling, and a general category of consequence analysis models. Previous and ongoing studies on the safety of waste management systems are discussed along with their limitations and potential improvements. The major safety methods and waste management safety related studies are surveyed. This survey provides information on what safety methods are available, what waste management safety areas have been analyzed, and what are potential areas for future study. DOE

N83-17303# Pacific Northwest Lab., Richland, Wash.
THE EFFECTS OF SURFACE AREA TO VOLUME RATIO AND SURFACE ROUGHNESS ON WASTE GLASS LEACHING
G. L. McVay, C. Q. Buckwalter, and L. R. Pederson 1981 25 p refs Presented at the Am. Ceramic Soc. Conf., Newport Beach, Calif., 25 Oct. 1981
(Contract DE-AC06-76RL-01830)
(DE82-005229; PNL-SA-9957; CONF-811088-3) Avail: NTIS HC A02/MF A01

This study assesses the effects of surface roughness and surface area to solution volume (SA/V) ratio changes on the leaching of PNL 76-68, a simulated nuclear waste glass. Monlith specimens were used to avoid the difficulties associated with powders. Inductively Coupled Argon Plasma Spectroscopy (ICP) was used to analyze leachate solutions. Solid samples were depth profiled using Secondary Ion Mass Spectroscopy (SIMS). Corrosion of PNL 76-68 glass increased with increased surface roughness at a constant solution volume, in agreement with earlier studies on simple glasses. However, the increased leaching occurred only for several days at 90 C, after which the rates of reaction of glasses given three widely different surface preparations were essentially identical. In sharp contrast to the results of earlier studies on simple silicate glasses, leaching on PNL 76-68 glass strongly decreased with increases in the SA/V ratio. DOE

74 OPTICS

Includes light phenomena.

N83-17304 Commonwealth Scientific and Industrial Research Organization, Mordialoc (Australia). Div. of Atmospheric Physics.
GREY SCALE VISUAL DISPLAY FOR RAPID DATA MONITORING AND STORAGE
J. C. Scott 1982 25 p refs
(CSIRO-TP-43; ISBN-0-643-03160-X) Avail: Issuing activity

An inexpensive grey scale or color visual display unit is described. The microprocessor controlled unit was primarily designed for real time analysis and storage of atmospheric backscatter data collected using a mini-computer controlled ruby laser radar system. The versatility of the system hardware is further illustrated by describing briefly its application to two video digitizer techniques. Author

N83-17305* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
COLLIMATED BEAM MANIFOLD WITH THE NUMBER OF OUTPUT BEAMS VARIABLE AT A GIVEN OUTPUT ANGLE Patent
Cecil W. Campbell and Robert B. Owen, inventors (to NASA) Issued 15 Sep. 1980 5 p Filed 15 Sep. 1980 Supersedes N80-34251 (18 - 24, p 3353)
(NASA-Case-MFS-25312-1; US-Patent-4,362,361;
US-Patent-Appl-SN-187106; US-Patent-Class-350-171) Avail: US Patent and Trademark Office CSCL 20F

An optical manifold is described which transforms a collimated beam, such as a laser beam, into a plurality of parallel beams having uniform intensity or having a desired intensity ratio. The manifold comprises an optical substrate coated on its rear surface with a fully reflective layer and on its front surface with a partially reflecting layer having a reflectivity gradient. An input collimated beam entering the rear surface and impinging on the front surface is reflected, multiply between the front and rear surfaces producing a plurality of parallel beams that emerge from the front surface. The intensities of the emerging beams have a relationship that depends on the reflectivity of the front surface at the points where the beams emerge. By properly selecting the reflectivity gradient, the emerging beams have uniform intensity or a desired intensity ratio. Official Gazette of the U.S. Patent and Trademark Office

N83-17306# Chicago Aerial Industries, Inc., Barrington, Ill.
FLIR STABILIZATION STUDY Final Technical Report, 15 Oct. 1981 - 15 Mar. 1982
D. DeFoe, T. Goodrich, J. Martin, and C. Schleifer Fort Belvoir, Va. Night Vision and Electro-Optics Labs. Apr. 1982 179 p
(Contract DAAK70-81-C-0255)

(AD-A119859; CAI-7901-A002) Avail: NTIS HC A09/MF A01 CSCL 17/5

Precision pipeline correlation has been shown to be a superior method for stabilizing FLIR imagery. A pipeline correlation stabilization module provides better performance than gyro transducers, is inherently tuned to image parameters, can be remotely located from the sensor and can be used for passive or active stabilization of the image. In addition, the pipeline correlation module will provide edge enhanced imagery and a measure of focus of the sensor. With the addition of one board, the module will provide a motion map or, given two separated boresighted sensors, a range map of the scene. A special function module can be connected to provide stabilized, scaled, integrated and dynamically-sampled imagery as desired. GRA

N83-17307# TRW Electronic Components Group, Philadelphia, Pa. Research and Development Labs.

FIELD EXPEDIENT REPAIR OF FIBER OPTIC CABLES Semiannual Report, 1 Oct. 1981 - 30 Apr 1982

John G. Woods May 1982 45 p refs

(Contract DAAK80-81-C-0085)

(AD-A120380; CECOM-81-C-0085-1; SAR-1) Avail: NTIS HC A03/MF A01 CSCL 20/6

This Interim Report describes the design of a field expedient fiber optics cable splicing system. The field splice kit will include a manually operated splicing machine which has all of the tools for making the cable repair mounted on a single platform, transportable in a hand-carried or back-packed case. The splice consists of glass four-rod alignment guides pre-mounted in a splice housing. Means are provided for fiber and cable retention in the housing to effect a rugged cable repair. The procedure for making the cable repair is outlined and described with the aid of a series of photographs of a wooden model of the splicing machine. The manipulations required to make the splice are designed to be simple and performable under adverse field conditions.

Author (GRA)

N83-17308# California Univ., Livermore. Lawrence Livermore Lab.

A SCANNING REFLECTION AND TRANSMISSION PHOTOMETER FOR LARGE HIGH POWER LASER OPTICS

N. L. Thomas, W. L. Robinson, G. R. Wirtenson, and E. P. Wallerstein 11 Dec. 1981 17 p ref Presented at the OSA Workshop on Optical Fabrication, Anaheim, Calif., 9-11 Dec. 1981

(Contract W-7405-eng-48)

(DE82-005974; UCRL-86762; CONF-811216-1) Avail: NTIS HC A02/MF A01

The Nova OTR (overall transmittance/reflectance) photometer operates at 1.064 nm, 528 nm, or 351 nm in order to closely simulate 1st, 2nd and 3rd harmonic frequencies of the Nova fusion laser. The optic is scanned on a large XY carriage while reflectance or transmittance data is taken on-the-fly. The system is controlled by an LSI 11/23 computer which processes the data and prints out the results in hard copy form, or stores data on a memory disk. The detectors are temperature controlled to within +/- 0.01 C which aids in achieving an absolute accuracy of +/- 0.1 to +/- 0.5% of full scale, depending on the operating point. The photometer is capable of scanning a large optic (1 meter in diameter) in 20 to 30 minutes. DOE

N83-17309# California Univ., Livermore. Lawrence Livermore Lab.

ADVANCES IN OPTICAL MATERIALS FOR LARGE APERTURE LASERS

S. E. Stokowski, W. H. Lowdermilk, F. T. Marchi, J. E. Swain, E. P. Wallerstein, and G. R. Wirtenson 15 Dec. 1981 15 p refs Presented at Electro-Optics/Laser '81, Anaheim, Calif., 17-19 Nov. 1981

(Contract W-7405-eng-48)

(DE82-006290; UCRL-86656; CONF-811164-1) Avail: NTIS HC A02/MF A01

Large aperture Nd: glass lasers are used to investigate the feasibility of inertial confinement fusion. High power laser light is focussed onto a small (100 to 500 micron) target containing a deuterium-tritium fuel mixture. During the short (1 to 5 ns) laser pulse the fuel is compressed and heated, resulting in fusion reactions. The generation and control of the powerful laser pulses for these experiments requires the development of new optical materials, fabrication techniques, and coatings. Developments in these areas are discussed. DOE

N83-17310# Brookhaven National Lab., Upton, N. Y.

SILICON CARBIDE MIRRORS FOR HIGH POWER APPLICATIONS

Peter Z. Takacs Nov. 1981 20 p refs Presented at the Topical Meeting on Non-Oxide Ceramics, South Yarmouth, Mass., 5-6 Oct. 1981; sponsored by the New England Section of the Am. Ceramics Soc. Submitted for publication

(Contract DE-AC02-76CH-00016)

(DE82-005506; BNL-30341; CONF-8110136-1) Avail: NTIS HC A02/MF A01

The advent of synchrotron radiation (SR) sources and high energy lasers (HEL) in recent years has brought about the need for optical materials that can withstand the harsh operating conditions in such devices. The SR mirrors must be ultra-high vacuum compatible, must withstand intense X-ray irradiation without surface damage, must maintain surface figure under thermal loading and must be capable of being polished to an extremely smooth surface finish. Chemical vapor deposited silicon carbide, in combination with sintered substrate material, needs these requirements and offers additional benefits as well. It is an extremely hard material and offers the possibility of being cleaned and recoated many times without degradation of the surface finish, thereby prolonging the lifetime of expensive optical components. It is an extremely strong material and offers the possibility of weight reduction over conventional mirror materials. DOE

N83-17311# Pacific Northwest Lab., Richland, Wash.

RECENT DEVELOPMENTS IN REACTIVELY SPUTTERED OPTICAL THIN FILMS

W. T. Pawlewicz, P. M. Martin, D. D. Hays, and I. B. Mann Dec. 1981 39 p refs Presented at SPIE Optical Coatings for Energy Efficiency and Solar Appl. Conf., Los Angeles, 25 Jan 1982

(Contract DE-AC06-76RL-01830)

(DE82-007163; PNL-SA-9859; CONF-820107-6) Avail: NTIS HC A03/MF A01

Highlights of a multiyear effort to develop new or improved thin film optical coating materials through the use of reactive sputtering techniques are presented. Reactive sputtering is shown to be an extremely versatile technique capable of synthesizing broad classes of materials in a straightforward manner. The exceptional utility of sputtering for preparation of hard coatings such as oxides, nitrides and novel materials based on Si and Ge is described. Some of these coating materials cannot be made by conventional evaporative techniques. Reactive sputtering is shown to allow precise control of coating composition, microstructure and the resulting optical properties. Examples of multilayer coatings such as all dielectric and dielectric enhanced mirrors made from reactively sputtered materials are included, and simple yet elegant fabrication techniques are introduced. The reactive sputtering technique and equipment used specifically for optical coatings are briefly described, and comparison is made with the conventional evaporative approach. DOE

N83-17312# Standard Elektrik Lorenz A.G., Stuttgart (West Germany). Materials and Components Div.

NEW PASSIVE ELECTRO-OPTICAL MATERIALS AND APPLICATIONS

K. Diekstall, A. Gutu-Nelle, J. Lauckner, F. Lutz, S. Muller, F. Seibold, H. Schichl, and H. Volz Aug. 1982 154 p refs Transl. into ENGLISH of "Neue Passive Elektro-Optische Werkstoffe und Anwendungen" BMFT, Bonn, West Germany, Dec. 1980 Original language document was announced as N81-33981

(PB82-255571; BMFT-FB-T-80-166) Avail: NTIS HC A08/MF A01 CSCL 20F

High-quality electro-optical ceramics based on lead-lanthanum

zirconate titanate (PLZT) can be manufactured economically by coprecipitation of the base materials and vacuum sintering of the green blocks. Magnesium additives halve the operating voltage for the same contrast ratio. Transparent electrodes which remain transparent up to a wavelength of 2,400 nm and provide an overall transparency value at 80% can be formed by sputtering indium-tin oxide. The life of sputtered electrodes is at least 2 x 10 to the 8th power switching cycles. The contrast ratio of PLZT in the light-scattering mode amounts typically to 100:1 at 500 nm, decreasing to 5:1 at 1,000 nm. Switching time and electrical field strength for a given contrast ratio increase with operating temperature. In the birefringence mode, the contrast ratio amounts typically to 10,000:1 at a field strength of 800 V/mm and a thickness of 0.4 mm. In tests, PLZT specimens performed well as light modulators, light-intensity stabilizers, and welding-helmet visors. They were not competitive with existing technologies for numerical displays. GRA

N83-17368*# Alabama Univ., Huntsville. Dept. of Industrial and Systems Engineering.
REFLECTANCE MEASUREMENTS
Robert A. Brown *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 17 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20F

N83-17372*# College of Southern Georgia, Statesboro. Dept. of Mathematics and Computer Science.
A RECURSIVE ALGORITHM FOR ZERNIKE POLYNOMIALS
John W. Davenport *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 13 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20F

N83-17391*# South Carolina State Coll., Orangeburg. Dept. of Natural Sciences.
OPTICAL CONTACTING OF QUARTZ
Linda L. Payne *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 9 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20F

N83-17401*# Alabama A & M Univ., Normal. Dept. of Physics.
THE STUDY OF X-RAY SCATTERING TO DETERMINE SURFACE TOPOGRAPHY OF SMOOTH SURFACES
Alton C. Williams *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 24 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20F

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N83-17313*# National Aeronautics and Space Administration, Washington, D. C.
DETERMINATION OF THE TEMPERATURE OF A DENSE PLASMA FROM A SPECTRAL LINE SHIFT
A. M. Sultanov and V. A. Ageyev Nov. 1982 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk Tadzh. SSR (USSR), v. 16, no. 7, 1973 p 26-29 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77000; NAS 1.15:77000) Avail: NTIS HC A02/MF A01 CSCL 20I

The method of maximum spectral line shift proposed by Bardocz, et al, (1966) was successfully applied in the diagnostics of dense plasmas produced by high power pulse discharges. It is pointed out that the effect of the shock wave pressure on the spectral line shift has to be taken into account in order to obtain accurate results with this method for high power discharges. A pressure dependent function was introduced in the expression given by those authors to provide the necessary correction.Author

N83-17314# United Kingdom Atomic Energy Authority, Culham (England).
CLOSED MAGNETIC TRAPS WITH RECTILINEAR SECTIONS
V. V. Arsenin, V. M. Glagolev, B. B. Kadmotsev, V. P. Pastukhov, B. A. Trubnikov, and V. D. Shafranov Aug. 1982 22 p refs Transl. into ENGLISH of rept. IAEA-CN-41/073 presented at the 9th IAEA Conf. on Plasma Phys. and Controlled Nucl. Fusion Res., (US), 1982 Conf. held in Baltimore, Md., 1-8 Sep. 1982
(BLL-CTO-2105-(9091.9F); IAEA-CN-41/073) Avail: NTIS HC A02/MF A01

Aspects of plasma equilibrium and MHD stability in the Dracon closed magnetic trap which contains long rectilinear sections with a homogeneous magnetic field are discussed. Unlike racetrack stellarators, the equilibrium plasma pressure in the Dracon trap does not depend on the length of the rectilinear sections as a result of the incorporation of special connecting curvilinear elements. This system combines the positive qualities of open traps (high average beta and simple design of the rectilinear section) and closed systems (no plasma losses along field lines). The following topics are examined: (1) plasma equilibrium in a trap containing curvilinear elements with a three dimensional axis; (2) three methods of stabilizing flute perturbations; (a) by creating a magnetic well in the curvilinear elements using auxiliary helical windings; (b) by means of an anisotropic high-beta plasma confined in an additional minimum-B trap; (c) by a relativistic electron ring (bumpy-torous-type stabilization). Neoclassical theory is used to give preliminary estimates of plasma losses and to obtain approximate parameters of a fusion reactor. Author

N83-17315*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A MECHANISM FOR PLASMA WAVES AT THE HARMONICS OF THE PLASMA FREQUENCY FORESHOCK BOUNDARY
Alexander J. Klimas Dec. 1982 42 p refs Submitted for publication
(NASA-TM-84954; NAS 1.15:84954) Avail: NTIS HC A03/MF A01 CSCL 03B

A bump-on-tail unstable reduced velocity distribution, constructed from data obtained at the upstream boundary of the electron foreshock by the GSFC electron spectrometer experiment on the ISEE-1 satellite, is used as the initial plasma state for a numerical integration of the 1D-Vlasov-Maxwell system of equations. The integration is carried through the growth of the instability, beyond its saturation, and well into the stabilized plasma regime. A power spectrum computed for the electric field of the stabilized plasma is dominated by a narrow peak at the Bohm-Gross frequency of the unstable field mode but also contains significant power at the harmonics of the Bohm-Gross frequency. The harmonic power is in sharp peaks which are split into closely spaced doublets. The fundamental peak at the Bohm-Gross frequency is split into a closely spaced triplet. The mechanism for excitation of the second harmonic is shown to be second order wave-wave coupling. A.R.H.

N83-17316# Naval Research Lab., Washington, D. C. Laser Plasma Branch.
BALLISTIC PENDULA FOR MEASURING THE MOMENTUM OF A LASER-PRODUCED PLASMA
J. Grun (Mission Research Corp.) and B. H. Ripin 17 Sep. 1982 13 p refs
(Contract DE-AI08-79DP-40092)
(AD-A120818; NRL-MR-4900) Avail: NTIS HC A02/MF A01 CSCL 20/5

We describe the use of a ballistic pendulum array to measure the momentum of a laser-produced plasma. An insitu calibration method is described and the pendulum results are compared to measurements made with other diagnostics. GRA

N83-17317# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COALESCENT 4 WAVE FREQUENCY MIXING IN A PLASMA, APPLIED TO PLASMA DIAGNOSIS
Zhong Quande 8 Sep. 1982 11 p refs Transl. into ENGLISH from Wuli (China), v. 11, no. 3, Mar. 1982 p 156-158
(AD-A119846; FTD-ID(RS)T-0953-82) Avail: NTIS HC A02/MF A01 CSCL 20/9

It is demonstrated that it is possible to use continuous infrared lasers of relatively low power as the source for frequency mixing in a continuous wave diagnosis of a plasma. J.M.S.

N83-17318# Naval Research Lab., Washington, D. C.
THE FUNDAMENTALS OF THE 3914A AND 3371A EMISSIONS FOR N2 AND AIR PLASMA DIAGNOSTICS
A. W. Ali 25 Oct. 1982 19 p refs
(DARPA Order 3718)
(AD-A120587; NRL-MR-4927) Avail: NTIS HC A02/MF A01 CSCL 07/4

A review is made of the basic physics of emission at 3914A and 3371A. The excitation cross section, the quenching coefficient and other mechanisms that affect these emissions are discussed in detail. Author (GRA)

N83-17319# Los Alamos Scientific Lab., N. Mex.
THE H-BEAM EMITTANCE MEASUREMENTS FOR THE PENNING AND THE ASYMMETRIC GROOVED MAGNETRON SURFACE-PLASMA SOURCES
H. V. Smith, Jr. and P. W. Alison 1981 4 p refs Presented at 1981 Linear Accelerator Conf., Santa Fe, N. Mex., 19-21 Oct. 1981
(Contract W-7405-eng-36)
(DE82-002369; LA-UR-81-3016; CONF-811083-7) Avail: NTIS HC A02/MF A01

Beam-intensity and emittance measurements show that the H-beam from our Penning surface-plasma source (SPS) has twice the intensity and ten times the brightness of the H-beam from an asymmetric, grooved magnetron SPS. We deduce H-ion temperatures of 5 eV for the Penning SPS and 22 eV for the asymmetric, grooved magnetron. DOE

N83-17320# California Univ., Livermore. Lawrence Livermore Lab.
DESIGN, FABRICATION AND TESTING OF THE MAGNET LINER SUPPORTS FOR THE MIRROR FUSION TEST FACILITY
Y. Chang 9 Oct. 1981 3 p refs Presented at 9th Symp. on Engr. Problems of Fusion Res., Chicago, 26-29 Oct. 1981
(Contract W-7405-eng-48)
(DE82-001588; UCRL-85996; CONF-811040-42) Avail: NTIS HC A02/MF A01

The support system that mounts the liquid nitrogen panels, water panels, and manifolds of the magnet liner system is discussed. Design requirements, material selection, engineering analysis, and fabrication are addressed. DOE

N83-17321# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
ELMO BUMPY TORUS PROOF OF PRINCIPLE, PHASE 2, TITLE 1 REPORT. VOLUME 7: CRYOGENIC SYSTEM
T. J. Poteat 26 Feb. 1982 282 p Prepared for ORNL, Tenn.
(Contract W-7405-eng-26)
(DE83-001501; ORNL/Sub-81-21099-1-07; EBT-P010) Avail: NTIS HC A13/MF A01

This document, Volume VII EBT-P Cryogenic System Title I Design Report, describes the system that resulted from the Title I Preliminary Design effort. It is a self-contained document that can be read apart from the other Volumes comprising the EBT-P Title I Report. This document is a contract deliverable item and provides the detail necessary to support the Cryogenic System design contained in the EBT-P Baseline Design Data Book. DOE

N83-17322# California Univ., Livermore. Lawrence Livermore Lab.
FOKKER-PLANCK CALCULATIONS OF ELECTRON CYCLOTRON RESONANT HEATING (ECRH) IN MIRROR GEOMETRY
B. W. Stallard, Y. Matsuda, and W. M. Nevins 25 Nov. 1981 15 p refs presented at the 2nd Workshop on Hot Electron Ring Phys., San Diego, Calif., 1-3 Dec. 1981
(Contract W-7405-eng-48)
(DE82-004388; UCRL-86826; CONF-811203-2) Avail: NTIS HC A02/MF A01

A time dependent, bounce averaged Fokker-Planck code, with quasi-linear diffusion at fundamental and second harmonic frequencies, was used to study cold plasma trapping and heating of hot electrons in mirror geometry. Both electron-electron and electron-ion Coulomb collisions are included. The code can model either cavity heating (electric field throughout cavity as in EBT) or beam controlled heating (electric field spatially restricted as in the TMX-Upgrade tandem mirror). The heating method has implications for the equilibrium energy and anisotropy of the hot electrons. In TMX-Upgrade, off midplane heating at the second harmonic in the thermal barrier is planned as a means to control anisotropy (T/sub parallel//T/sub perpendicular). By spatially limiting (limit in B) the microwave beam and with strong single pass absorption, the mean hot electron energy may also be controlled since the heating rate decreases at high energy due to the relativistic mass shift of the resonance to higher magnetic field. DOE

N83-17323# Brookhaven National Lab., Upton, N. Y. Dept. of Nuclear Energy.
HYFIRE: A TOKAMAK/HIGH-TEMPERATURE ELECTROLYSIS SYSTEM
J. A. Fillo, J. R. Powell, R. Benenati, T. C. Varljen, J. W. H. Chi, and J. S. Karbowski 1981 4 p refs Presented at the 9th Symp. on Eng. Probl. of Fusion Res., Chicago, 26 Oct. 1981 Prepared in cooperation with Westinghouse Electric Corp., Pittsburgh, Pa.
(Contract DE-AC02-76CH-00016)
(DE82-004806; BNL-30297; CONF-811040-136) Avail: NTIS HC A02/MF A01

The development of a system for using the thermal energy produced in a high-temperature Tokamak blanket to provide the electrical and thermal energy required to drive a high temperature water electrolysis process is described. Emphasis is on two design points, one consistent with electrolyzer peak inlet temperatures of 1400 C, which is an extrapolation of present experience, and one consistent with a peak electrolyzer temperature of 1100 C. This latter condition is based on laboratory experience with high temperature solid electrolyte fuel cells. A major conclusion is that the technical integration of fusion and high temperature electrolysis appears to be feasible and that overall hydrogen production efficiencies of 50 to 55% seem possible. DOE

N83-17324# California Univ., Livermore. Lawrence Livermore Lab.
SIMULATION OF MULTI-FREQUENCY ECRH
T. D. Rognlien 23 Nov. 1981 15 p refs Presented at the 2nd Workshop on Hot Electron Ring Phys., San Diego, Calif., 1-3 Nov. 1981
(Contract W-7405-eng-48)
(DE82-004380; UCRL-86811; CONF-811203-3) Avail: NTIS HC A02/MF A01

A test particle simulation code was used to investigate electron cyclotron heating in a magnetic mirror well. Heating with one frequency and heating with two closely spaced frequencies are compared. The code follows electron orbits in the presence of one or two monochromatic ECRH waves using guiding center equations and an equation for tne electron gyrophase. Coulomb collisions with electrons and ions are simulated as a Monte Carlo scattering process. For the parameters of SM-1, at the fundamental resonance, the heating rate or velocity rf diffusion coefficient begins to decrease significantly due to superadiabatic effects. Using multiple frequencies pushes the superadiabatic boundary to higher energies. For a given energy, the optimum frequency separations for two frequencies are those which cause the axial bounce resonances to interlace. DOE

N83-17325# Princeton Univ., N. J. Plasma Physics Lab.
THE STELLARATOR APPROACH TO TOROIDAL PLASMA CONFINEMENT
John L. Johnson Nov. 1981 72 p refs
(DE82-005727; PPPL-1856) Avail: NTIS HC A04/MF A01

An overview is presented of the development and current status of the stellarator approach to controlled thermonuclear confinement. Recent experimental, theoretical, and systems developments have made this concept a viable option for the evolution of the toroidal confinement program. Some experimental study of specific problems associated with departure from two-dimensional symmetry must be undertaken before the full advantages and opportunities of steady-state, net-current-free operation can be realized. Author

N83-17326# Princeton Univ., N. J. Plasma Physics Lab.
PLASMA SWEEPER TO CONTROL LOWER HYBRID WAVE COUPLING
R. W. Motley and J. Glanz Nov. 1981 12 p refs
(Contract DE-AC02-76CH-03073)
(DE82-004735; PPPI-1853) Avail: NTIS HC A02/MF A01

Experimental tests of an anti E x anti B plasma sweeper, designed to control the plasma density near the mouth of a phased waveguide array, are described. DOE

N83-17327# California Univ., Livermore. Lawrence Livermore Lab.
THEORY OF THE OPTIMAL DESIGN OF STRAIGHT-AXIS MINIMUM-B MIRROR CONFINEMENT CONFIGURATIONS
Lawrence S. Hall 6 Jul. 1982 25 p refs
(Contract W-7405-eng-48)
(DE83-000654; UCID-19444) Avail: NTIS HC A02/MF A01

The design of modern straight axis linked mirror plasma confinement configurations is addressed. The relevant factors are set down together with the techniques for analytical optimization of the design of a general configuration. A general sufficient condition for the stability of an arbitrary guiding center MHD equilibrium is derived. This condition makes explicit the stabilizing qualities of good normal curvature and diamagnetic axial current. The instability drive depends on two terms: one carries the sign of normal curvature and the other relates to the relative signs of geodesic curvature and geodesic torsion. The theory is applied to low beta, large aspect ratio equilibria for which analytic expressions for the confining magnetic fields are known. Two optimizations are required to specify the arbitrary features of the quadrupole and dipole fields. One optimization is nonlinear and can be performed by the ordinary calculus of variations; the second optimization is linear and subject to the rules of game theory. Appropriate quality factors are obtained, thus giving the designer quantitative measures with which to balance design trade offs. DOE

N83-17328# Massachusetts Inst. of Tech., Cambridge. Dept. of Nuclear Engineering.
FAILURE CRITERIA FOR FUSION-REACTOR FIRST-WALL STRUCTURAL DESIGN
A. O. Adegbulugbe and J. E. Meyer 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract DE-AS02-78ER-10107)
(DE82-006753; DOE/ER-10107/10; CONF-810831-73) Avail: NTIS HC A02/MF A01

Because of the high temperature and high adiation damage conditions in which they must operate, fusion first walls can fail by various modes. Structural design rules are presented to guard against four major possible modes of failure; excessive deformation, cyclic damage at elevated temperature, propagation and growth of flaws, and radiation damage. Lifetime calculations of fusion first walls based on these design rules are presented to demonstrate the application of these rules. DOE

N83-17329# California Univ., Livermore. Lawrence Livermore Lab.
STATE OF WORK ON THE AMBAL EXPERIMENT
G. W. Hamilton 2 Oct. 1981 17 p refs
(Contract W-7405-eng-48)
(DE82-010991; UCID-19206) Avail: NTIS HC A02/MF A01

A diagram of the AMBAL tandem mirror experiment is given. The main topics discussed are the vapor jet, titanium vaporizer, plasma gun, startup injectors, main injectors, diagnostics, and numerical modeling. DOE

N83-17330# California Univ., Livermore. Lawrence Livermore Lab.
COATINGS FOR LASER FUSION
W. H. Lowdermilk 18 Dec. 1981 32 p refs Presented at the SPIE Optical Coatings for Energy Efficiency and Solar Appl. Conf., Los Angeles, 25-29 Jan. 1982
(Contract W-7405-eng-48)
(DE82-005698; UCRL-87037; CONF-820107-2) Avail: NTIS HC A03/MF A01

Optical coatings are used in lasers systems for fusion research to control beam propagation and reduce surface reflection losses. The performance of coatings is important in the design, reliability, energy output, and cost of the laser systems. Significant developments in coating technology are required for future lasers for fusion research and eventual power reactors. DOE

N83-17331# Idaho National Engineering Lab., Idaho Falls.
OVERVIEW OF FUSION REACTOR SAFETY
S. Cohen and J. G. Crocker 1981 15 p refs Presented at the 6th Intern. Conf. on Structural Mech. in Reactor Technol., Paris, 17-21 Aug. 1981
(Contract DE-AC07-76ID-01570)
(DE82-005951; CONF-10801-59) Avail: NTIS HC A02/MF A01

Use of deuterium-tritium fusion reactors requires examination of several major safety and environmental issues: (1) tritium inventory control; (2) neutron activation of structural materials, fluid streams and reactor hall environment; (3) release of radioactivity from energy sources including lithium spill reactions, superconducting magnet stored energy release, and plasma disruptions; (4) high magnetic and electromagnetic fields associated with fusion reactor superconducting magnets and radio frequency heating devices; and (5) handling and disposal of radioactive waste. Early recognition of potential safety problems with fusion reactors provides the opportunity for improvement in design and materials to eliminate or greatly reduce these problems. With an early start in this endeavor, fusion should be among the lower risk technologies for generation of commercial electrical power. DOE

N83-17332# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
PRELIMINARY EVALUATION OF BETA-SPODUMENE AS A FUSION REACTOR STRUCTURAL MATERIAL
P. V. Kelsey, Jr., R. E. Schmunk, and S. P. Henslee 1981 4 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, Wash., 9 Aug. 1981
(Contract DE-AC07-76ID-01570)
(DE82-006269; CONF-810831-80) Avail: NTIS HC A02/MF A01

Beta spodumene was investigated as a candidate material for use in fusion reactor environments. Properties which support the use of beta-spodumene include good thermal shock resistance, a very low coefficient of thermal expansion, a low Z composition which would result in minimum impact on the plasma, and a flexibility in fabrication processes. Specimens were irradiated in a test reactor to a fluence of 5.3 x 10 to the 22nd power n/sq m, E $>$ 0.1 MeV, and 4.9 x 10 to the 23rd power n/sq m thermal fluence in order to obtain a preliminary evaluation of the impact of irradiation on the material. Preliminary data indicate that the mechanical properties of beta-spodumene are little affected by irradiation. Gas production and release were also investigated. DOE

N83-17333# Westinghouse Electric Corp., Madison, Pa. Advanced Reactors Div.
EVALUATION OF INERTIAL-CONFINEMENT FUSION-ENGINEERING OPPORTUNITIES ON EXISTING AND PLANNED

FACILITIES Final Report
D. A. Sink Aug. 1982 183 p
(EPRI Proj. 1971-1)
(DE82-906453; EPRI-AP-2521) Avail: NTIS HC A09/MF A01

A group of experiments that provide the most essential data needed by ICF reactor designers were identified. Seven ICF reactor designs were identified, including two hybrid concepts; their design teams identified 97 data needs by response to a questionnaire and by direct interview. A wide ranging search identified 61 facilities which could provide the needed data. To define the experiments more completely and to find a consensus within the ICF and experimental facility communities as to the importance of the experiments, a workshop was held in which both communities participated. The workshop produced 78 experiments through 12 panel sessions and ranked them in a plenary session using an accelerated Delphi method. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N83-17334# British Library Lending Div., Boston Spa (England).
A SYSTEMATIC ANALYSIS OF ALKALOIDS BY THIN LAYER CHROMATOGRAPHY
D. Waldi 7 Dec. 1982 12 p refs Transl. into ENGLISH from J. Chromatogr. (Netherlands), v. 6, 1961 p 611-73
(BLL-M-28292-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Fifty-four alkaloids previously divided into four groups on the basis of their behavior in solvents of different compositions using paper chromatography, were subdivided into two groups by thin paper chromatography. The behavior of the alkaloids in different support layers (silica gel, aluminum oxide alkaline, and diatomite G) was examined. It was found that the maximum amount of coating that can be developed without tailing came to a few milligrams on the silica gel plates, a few tenths of a milligram on aluminum oxide, and generally only 25 mg to 50 mg on inactive diatomite plates. The alkaloids could be adequately distinguished from one another by the spraying reagent ince not only color differences but also color changes could be seen during and after spraying. The coloring of the alkaloids by iodine plateate reagent was also determined by the concentration of the alkaloid used. The edge was often a different color from the center. A.R.H.

N83-17335*# Cornell Univ., Ithaca, N. Y. Lab. of Atomic and Solid State Physics.
APPROACHES FOR REDUCING THE INSULATOR-METAL TRANSITION PRESSURE IN HYDROGEN
A. E. Carlsson and N. W. Ashcroft Jan. 1983 11 p refs
(Contract NAG2-159)
(NASA-CR-169804; NAS 1.26:169804) Avail: NTIS HC A02/MF A01 CSCL 20L

Two possible techniques for reducing the external pressure required to induce the insulator-metal transition in solid hydrogen are described. One uses impurities to lower the energy of the metallic phase relative to that of the insulating phase. The other utilizes a negative pressure induced in the insulating phase by electron-hole pairs, created either with laser irradiation or pulsed synchrotron sources. Author

N83-17336*# Syracuse Univ., N. Y. Dept. of Electrical and Computer Engineering.
DYNAMICAL ELECTROPHOTOCONDUCTIVITY IN POLYCRYSTALLINE THIN FILMS Final Report
Stephen T. Kowel and Philipp G. Kornreich Dec. 1982 66 p refs Submitted for publication
(Grant NsG-1602)
(NASA-CR-169753; NAS 1.26:169753) Avail: NTIS HC A04/MF A01 CSCL 20K

Polycrystalline cadmium sulfide (CdS) films were deposited on lithium niobate (LiNbO3) substrates by vacuum evaporation and annealed to obtain high photosensitivity. The change in photoconductivity of these films due to the penetration of electric fields associated with elastic waves propagating on their substrates was demonstrated and studied. The relationship between the acoustic electric field and the induced change in film conductivity was found to be a nonlinear one. The fractional change in conductivity is strongly dependent on the light intensity and the film temperature, showing a prominent maximum as a function of these quantities. The largest recorded fractional change in conductivity was about 25% at electric fields of the order of 1,000 volts per centimeter. A phenomological model was developed based on the interaction between the space charge created by the electric field and the electron trapping states in the photoconductor. A.R.H.

N83-17337# Evans (Charles) and Associates, San Mateo, Calif.
DOD/DESAT PHASE 1. A REPORT ON THE USE OF SURFACE ANALYTICAL TECHNIQUES TO ELUCIDATE SEMICONDUCTOR CRYSTAL GROWTH Final Report
Charles A. Evans, Jr. and Charles J. Hitzman 30 Jun. 1982 25 p
(Contract N00014-82-C-0141)
(AD-A120341) Avail: NTIS HC A02/MF A01 CSCL 20/7

The purpose of this Phase 1 research program was to determine the ability of combining carefully planned crystal growth experiments with surface sensitive spectroscopies to elucidate fundamental phenomena in semiconductor crystal growth methods. This study has employed high performance secondary ion mass spectrometry (SIMS) and other surface sensitive spectroscopies such as scanning electron microscopy (SEM), Auger electron spectroscopy (AES), and energy dispersive X-ray spectrometry (EDS) in the study of thin crystalline films grown by organometallic vapor phase epitaxy (OMVPE), molecular beam epitaxy (MBE), and liquid phase epitaxy (LPE) processes. The ultimate goal of this research is to provide insight into the mechanisms involved in these crystal growth methods. Studies have also employed a new rapid isothermal annealing system for the solid phase crystal regrowth of ion implanted silicon. GRA

N83-17338# Rochester Univ., N. Y. Dept. of Chemistry.
LASER-STIMULATED ADSPECIES INTERACTION WITH A SEMICONDUCTOR SURFACE Interim Technical Report
William C. Murphy and Thomas F. George Sep. 1982 20 p refs
(Contract N00014-80-C-0472)
(AD-A120259; UROCHESTER/DC/82/TR-24) Avail: NTIS HC A02/MF A01 CSCL 20/12

The surface electronic charge distrbutions of a one-dimensional semiconductor are compared for the ground state and the laser-excited surface states. A charged adspecies interaction potential with these excited surface states is examined for the case of silicon. The use of a laser to enhance description or adsorption by this process is discussed. GRA

N83-17339# Rochester Univ., N. Y. Dept. of Chemistry.
NEUTRALIZATION OF IONS AT AN ELECTRONICALLY-EXCITED SEMICONDUCTOR SURFACE
Lee Hai-Woong, William C. Murphy, and Thomas F. George Sep. 1982 19 p refs
(Contract N00014-80-C-0472)
(AD-A120258; UROCHESTER/DC/82/TR-23) Avail: NTIS HC A02/MF A01 CSCL 20/12

Neutralization of positive ions colliding with a semiconductor surface is studied. It is shown that the neutralization probability can be significantly enhanced if the surface exposed to the impinging ions is electronically excited. The basic reason behind this is that the impinging ions have easier access to the excited surface electrons than to bulk electrons. GRA

N83-17340# Hughes Research Labs., Malibu, Calif.
STUDY OF BOUNDARY STRUCTURES Final Report, 1 May 1979 - 30 Jun. 1982
Ryoichi Kikuchi Sep. 1982 85 p refs

(Contract DAAG29-79-C-0090)
(AD-A120452; ARO-16468.2-PH) Avail: NTIS HC A05/MF A01 CSCL 20/2

Continuing the previous three-year project, atomic properties of boundaries between two solid phases are studied theoretically, using the cluster variation method (CVM). The 90 deg-rotational boundary in the binary Cu-Au ordered alloy phase is calculated using a four-point tetrahedron as the basic cluster of the CVM. The layers on the left of the boundary are perpendicular to the layers on the right-hand side. By calculating the excess free energy and the amount of adsorbed Au atoms, a first-order phase transition is derived within the boundary; there is a discontinuous change in the Au absorption as the overall composition of the system changes across the stoichiometric state. Also there is a switch-over from the low temperature phase to the high-temperature phase; the difference of the two phases is in the behavior of the layer parallel to the boundary. The ABC-CBA stacking boundary in the fcc lattice in the (110) direction is also studied. A reference hexagonal lattice with three times as many lattice points as the original fcc lattice is considered by supplementing the latter by interstitial points; atoms are assumed to move on the reference hexagonal lattice. GRA

N83-17341# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
STUDIES OF ADSORPTION AT WELL-ORDERED ELECTRODE SURFACES USING LOW ENERGY ELECTRON DIFFRACTION
Philip N. Ross, Jr. Oct. 1981 57 p refs Presented at the 5th Intern. Summer Inst. for Surface Sci., Milwaukee, 23-28 Aug. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE82-005256; LBL-13507; CONF-8108102-1) Avail: NTIS HC A04/MF A01

Studies of submonolayer structures on electrode surfaces using the combination of classical electrochemical methods with low energy electron diffraction (LEED) are described. It is shown that by use of this combination of techniques the enthalpy and entropy of adsorption onto well-ordered surfaces can be determined directly. The effect of imperfections in the surface on adsorption enthalpy can be readily determined using stepped surfaces (i.e., ordered periodic imperfections). The variation of enthalpy and entropy with coverage on structurally homogeneous surfaces can provide insight into substrate-adsorbate and adsorbate-adsorbate interactions. DOE

N83-17342# Brookhaven National Lab., Upton, N. Y. Metallurgy and Materials Science Div.
METALLURGICAL ASPECTS OF INTERSTRAND RESISTANCE
Masaki Suenaga 1981 13 p refs Presented at the US-Japan Superconductive Magnetic Energy Storage Workshop, Madison, Wis., 19 Oct. 1981
(Contract DE-AC02-76CH-00016)
(DE82-005504; BNL-30435; CONF-811051-3) Avail: NTIS HC A02/MF A01

Contact resistance between wires in superconducting cables is one of the primary factors determining losses in the conductor under time-varying magnetic fields, and values of the resistance are often used for the calculation of the losses in the conductor under time-varying magnetic fields, and values of the resistance are often used for the calculation of the losses in magnets without actual measurements of the values. Some measurements of the contact resistance, which were made for various purposes at Brookhaven National Laboratory, are presented emphasizing metallurgical aspects influencing contact resistance between two metals. DOE

N83-17343# Sandia Corp., Albuquerque, N. Mex.
THE ELECTRONIC PROPERTIES OF SEMICONDUCTOR GRAIN BOUNDARIES
C. H. Seager 1981 35 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16 Nov. 1981
(Contract DE-AC04-76DP-00789)
(DE82-004760; SAND-81-2385C; CONF-811122-38) Avail: NTIS HC A03/MF A01

Grain boundaries play an important role in determining the operating characteristics of devices such as varistors and thin film solar cells and transistors. One electron expressions, development for the transport coefficients of majority and minority carriers at grain boundaries were successful in predicting the measured electrical properties of bicrystals in lightly doped silicon. The status of understanding in this area is reviewed. Extensions of these calculations which were necessary to explain measurements on grain boundaries in degenerately doped GaAs are also examined. DOE

N83-17344# Oak Ridge National Lab., Tenn.
STRUCTURE AND PROPERTIES OF SINGLE CRYSTAL Al2O3 IMPLANTED WITH CHROMIUM AND ZIRCONIUM
C. J. McHargue, H. Naramoto, B. R. Appleton, C. W. White, and J. M. Williams 1981 7 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16 Nov. 1981
(Contract W-7405-eng-26)
(DE82-004117; CONF-811122-36) Avail: NTIS HC A02/MF A01

Single crystals of Al2O3 were implanted with chromium and zirconium to fluences of 1 to 10 to the 16th power to 1 x 10 to the 17th power ions/sq cm. Rutherford backscattering-channeling studies showed the surface layers to be damaged but crystalline with the implanted ions randomly distributed. The microhardness and indentation fracture toughness were higher for the random solutions than for conventionally formed solid solutions. Changes in structure and properties caused by annealing in air at temperatures up to 1800 C were studied. DOE

N83-17345# Oak Ridge National Lab., Tenn. Solid State Div.
VACANCY AND INTERSTITIAL LOOPS IN IRRADIATED COPPER
B. C. Larson and F. W. Young, Jr. Nov. 1981 9 p refs Presented at the Yamada Conf. on Point Defects and Defect Interactions in Metals, Kyoto, 16-20 Nov. 1981
(Contract W-7405-eng-26)
(DE82-004113; CONF-811150-1-DRAFT) Avail: NTIS HC A02/MF A01

Diffuse scattering of irradiation induced dislocation loops in metals are studied. Numerical calculational procedures were developed that provide accurate diffuse scattering cross sections for vacancy and interstitial loops, and these cross sections were used in conjunction with X-ray diffuse scattering studies of neutron and ion irradiated copper. Size distributions and concentrations were obtained for both vacancy and interstitial loops and these results are compared with electron microscopy measurements. The size distributions obtained from diffuse scattering measurements show the vacancy loops to be smaller and more numerous than the interstitial loops, and indicate that equal numbers of vacancies and interstitials are in loops. The diffuse scattering and microscopy size distributions agree at the larger sizes, but the diffuse scattering method identifies more loops of smaller sizes. DOE

N83-17346# Oak Ridge National Lab., Tenn.
STUDIES OF DEFECTS AND LIMITS OF SOLID SOLUBILITY IN SPE GROWN In AND Sb IMPLANTED SILICON
J. Narayan and O. W. Holland Nov. 1981 9 p refs Presented at the Ann. Meeting of the Mater. Res. Soc., Boston, 16-19 Nov. 1981 Submitted for publication
(Contract W-7405-eng-26)
(DE82-003986; CONF-811122-35) Avail: NTIS HC A02/MF A01

Transmission electron microscopy (plan view as well as cross section) and high resolution Rutherford backscattering and channeling techniques were combined to investigate residual defects and substitutional concentrations of In and Sb in < 100 > and < 100 > orientations of ion implanted silicon layers after solid phase epitaxial (SPE) growth at 475 to 600 C. The maximum concentrations of Sb and In in substitutional sites were respectively, 1.3 x 21st power and 5 to the 19th power cm-3, exceeding the respective retrograde maxima by factors of 18 and 60. These results provide direct evidence and solute trapping and metastable alloying under solid phase growth conditions. Accumulation of

solute at the crystalline amorphous interface was observed only for indium above a certain interfacial concentration. At still higher interfacial concentrations, the planar interface was observed to become unstable and SPE growth was retarded. DOE

N83-17347# Ames Design Collaborative, Iowa.
TWO-PHOTON ABSORPTION AND NONLINEAR POLARITON EFFECTS IN ORGANIC CRYSTALS Ph.D. Thesis - Iowa State Univ.
Carey Knowle Johnson Oct. 1981 189 p refs
(Contract W-7405-eng-82)
(DE82-005623; IS-T-962) Avail: NTIS HC A09/MF A01

Two photon excitation (TPE) and second harmonic generation (SHG) were studied in phenanthrene crystals as low temperatures (2 to 6 K). Analysis of vibronic structure reveals that the dominant intermediate states for TPA are those of B2 (L axis) symmetry. The TPE spectra principally associated with intermediate states of A1 (M) symmetry exhibit strong intramolecular vibronic coupling by totally symmetric vibrations. Polarized TPE spectra of mixed crystals of phenanthrene in fluorene confirm the predominance of the long axis mechanism in TPA and the participation of states of A1 symmetry by vibronic coupling. Position of the upper Davydov component of the origin depends on photon propagation direction and polarization in both TPE and SHG. The appearance of the dipole forbidden lower Davydov component in these spectra is discussed in terms of misalignment and excitation of a longitudinal exciton. DOE

N83-17348# Sandia Labs., Albuquerque, N. Mex.
MEASUREMENT OF THE MELT DYNAMICS IN LASER-ANNEALED SEMICONDUCTORS
P. S. Peercy, G. J. Galvin, Michael O. Thompson, J. M. Mayer (Cornell Univ.), and R. B. Hammond (Los Alamos Scientific Lab., N. Mex.) 1982 6 p refs
(Contracts DE-AC04-76DP-00789; F33615-80-C-1197)
(DE82-020407; SAND-82-0787C) Avail: NTIS HC A02/MF A01

Combined measurements of the transient electrical conductance, optical reflectance, and absorbed energy were used to determine the dynamics of the annealing process during laser irradiation of bulk silicon and silicon on sapphire. The combined transient conductance and optical reflectance yield the regrowth velocity and melt duration in bulk silicon; in silicon on sapphire the measurements also yield the melt velocity and maximum melt depth. Measurement of the absorbed energy provides energy coupling data used in numerical calculations of the melt dynamics for direct comparison with experiments in bulk silicon. The results indicate that annealing proceeds by a purely thermal process. M.G.

N83-17349# Sandia Labs., Albuquerque, N. Mex.
FINITE-ELEMENT THERMAL ANALYSES OF AN INTENSE NEUTRON SOURCE THIN-FILM TARGET
Samuel R. Subia, Jr. Dec. 1981 23 p refs
(Contract DE-AC04-76DP-00789)
(DE82-006995; SAND-81-1979) Avail: NTIS HC A02/MF A01

A heat transfer model of the target of the Neutron Source Test Facility (NSTF) was developed to predict the target surface temperature and isotherms through the target for ion beam power densities ranging from 2 kW sq cm to 5 kW sq cm. The model incorporated heat transfer coefficients for convection and nucleate boiling and was analyzed with the MARC-H4 CDC finite element computer code. Results of the analysis show that the target presently used in the NSTF can dissipate 4 kW sq cm with a surface temperature less than 450 C, which are the desired operating conditions. These results are within about 15% of experimental measurements of the target surface temperature from infrared pyrometry. At power densities greater than 3 kW sq cm, nucleate boiling takes place in the cooling channels. A recent post mortem analysis of a target revealed erosion of the cooling channel over a region that corresponds very closely to the region of nucleate boiling identified by the thermal analysis. DOE

N83-17350# Bendix Corp., Kansas City, Mo. Technical Communications.
THICK FILM INK CHEMISTRY
R. W. Gehman Mar. 1982 18 p refs
(Contract DE-AC04-76DP-00613)
(DE82-012050; BDX-613-2734) Avail: NTIS HC A02/MF A01

Twenty-six thick film inks from two vendors were proved for hybrid microcircuit production use. A data base of chemical information was established for all the inks to aid in future diagnostic and failure analysis activities. Efforts included both organic chemical analysis of printing vehicles and binders and inorganic chemical analysis of glass frits and electrically active phases. Analytical methods included infrared spectroscopy, mass spectroscopy, gas chromatography, X-ray fluorescence, emission spectroscopy, atomic absorption spectroscopy, and wet chemical techniques. DOE

N83-17351# Los Alamos Scientific Lab., N. Mex.
INTRODUCTION TO THE DISCUSSION OF STABILITY: REVIEW OF PROGRESS SINCE THE 1977 STABILITY WORKSHOP
S. L. Wipf 1981 7 p refs Presented at the Workshop on the Stability of Superconductors in He-1 and He-2, Saclay, France, 16-19 Nov. 1981
(Contract W-7405-eng-36)
(DE82-010432; LA-UR-82-135; CONF-811140-4) Avail: NTIS HC A02/MF A01

Progress in solving the problem of stability and degradation in superconducting coils is reviewed. DOE

N83-17352# Wisconsin Univ., Madison. Dept. of Nuclear Engineering.
VACANCY CLUSTER NUCLEATION DURING IRRADIATION WITH PREFERRED POINT-DEFECT ABSORPTION Ph.D. Thesis
Abderrahmane Si-Ahmed 1981 166 p refs
(Contract DE-AS02-78ER-40861)
(DE82-005194; DOE/ER-04861/T2) Avail: NTIS HC A08/MF A01

During high temperature irradiation of metals a new microstructure is produced through the formation of dislocation loops, voids, and precipitates. The formation of voids and both interstitial and vacancy type loops is critically dependent on the bias factors for each sink and on the interaction between sink and point defects. The recombination rate of vacancies and interstitials also depends on their mutual interaction. Therefore, the recombination coefficient as well as the bias factors for voids and vacancy and interstitial type loops are first derived, and subsequently utilized in studying their effects on the nucleation of both voids and vacancy type loops. The rate of recombination is proportional to a recombination radius. The computed values for this radius are in good agreement with measured values at low temperatures. DOE

N83-17353# Wacker-Chemie G.m.b.H. Burghausen (West Germany).
RESEARCH AND DEVELOPMENT OF TECHNOLOGIES FOR THE PREPARATION OF 3-5 SEMICONDUCTOR MATERIALS AND ON METHODS FOR EVALUATION OF THE QUALITY OF THESE MATERIALS: GALLIUM ARSENIDE CRYSTALS; GALLIUM ARSENIDE CRUCIBLE PULLING
M. Blaette Jul. 1982 24 p refs Sponsored by Bundesministerium fuer Forschung und Technologie
(PB82-259748; BMFT-FB-T-81-022) Avail: NTIS HC A02/MF A01 CSCL 20B

The economic synthesis of the polycrystalline starting material was investigated. For the industrial production of gallium arsenide crystals, which are used as substrates for the epitaxial growth of basic material for light emitting diodes, the Czochralski liquid encapsulation technique was developed. After preliminary experiments in a small puller, the parameters for crystal growth were tested and optimized in pulling equipment which was specially constructed for the purpose. Methods for diameter control were tested as well. By means of production scale pulling of crystals

with a diameter of 50 mm and a weight of 1.4 kg with dislocation densities of 50,000/sq cm, the objective was fully achieved. GRA

N83-17390*# South Carolina State Coll., Orangeburg. Dept. of Natural Sciences.
FABRICATION TECHNIQUES FOR SUPERCONDUCTING READOUT LOOPS
James E. Payne *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 16 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20L

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N83-17354# California Univ., San Diego. Dept. of Chemistry.
THERMODYNAMICS AND QUANTUM CORRECTIONS FROM MOLECULAR DYNAMICS FOR LIQUID WATER
Peter H. Berens, Donald H. J. Mackay, Gary M. White, and Kent R.. Wilson Oct. 1982 43 p refs Submitted for publication Sponsored in part by NSF, National Institute of Health, General Medical Science and Division of Research Resources
(Contract N00014-78-C-0325)
(AD-A120796; TR-10) Avail: NTIS HC A03/MF A01 CSCL 20/13

This paper treats the first problem, how to quantum correct the classical mechanical thermodynamic values available from molecular dynamics, Monte Carlo, perturbation, or integral methods in order to compare with experimental quantum reality. A subsequent paper will focus on the second difficulty, the effective computation of free energy and entropy. A simple technique, derived from spectral analysis of the atomic velocity time histories, is presented here for the quantum correction of classical thermodynamic values. This technique is based on the approximation that potential anharmonicities mainly affect the lower frequencies in the velocity spectrum where the system behaves essentially classically, while the higher spectral frequencies, where the deviation from classical mechanics is most pronounced, involve sufficiently harmonic atomic motions that harmonic quantum corrections apply. The approach is demonstrated by computation of the energy and constant volume heat capacity for water from classical molecular dynamics followed by quantum correction. The potential used to describe the interactions of the system of water molecules includes internal vibrational degrees of freedom and thus strong quantum effects. Comparison of the quantum corrected theoretical values with experimental measurements shows good agreement. GRA

N83-17355# Washington State Univ., Pullman. Dept. of Physics.
SHOCK-INDUCED CHEMICAL REACTIONS IN CONDENSED MATTER Technical Report, 1 Apr. 1978 - 30 Jun. 1982
George E. Duvall, Stephen A. Sheffield, Kendal M. Ogilvie, C. Robert Wilson, and Paul M. Bellamy Aug. 1982 229 p refs
(Contract N00014-77-C-0232)
(AD-A120516) Avail: NTIS HC A11/MF A01 CSCL 20/13

Some background information is given on fast reactions, detonations, shock waves. Research at Washington State University on liquid CS2 is summarized. Techniques for and results of measurements of characteristic reaction times are given in Section IV. A double shock method was used, a double wave observed, and times ranged from less than 10 nsec at 150 kb to several hundred at 80-90 kbars. An induction time was observed in some experiments and a quasi-coherent electrical signal appears to have generated in the reaction process. Reflection and absorption spectroscopy are reported in Section V. Reflection measurements show that the shocked liquid behaves like a poor conductor in the spectral range 2500-4000 A for shock pressures greater than about 20 kb. Transmission measurements show that extinction extends into the visible as shock pressures increase. The shift is linear with pressure about 20 kbars, but the dependence is more complicated at higher pressures. The observations do not appear to be compatible with static pressure and temperature measurements, but this observation requires further substantiation. Author (GRA)

N83-17356# Argonne National Lab., Ill.
TABLES OF THERMODYNAMIC PROPERTIES OF SODIUM
J. K. Fink Jun. 1982 214 p
(Contract W-31-109-eng-38)
(DE83-000923; ANL-CEN-RSD-82-4) Avail: NTIS HC A10/MF A01

The thermodynamic properties of saturated sodium, superheate sodium, and subcooled sodium are tabulated as a function of temperature. The temperature ranges are 380 to 2508 K for saturated sodium, 500 to 2500 K for subcooled sodium, and 400 to 1600 K for superheated sodium. Tabulated thermodynamic properties are enthalpy, heat capacity, pressure, entropy, density, instantaneous thermal expansion coefficient, compressibility, and thermal pressure coefficient. Tables are given in SI units and cgs units. DOE

N83-17357# Los Alamos Scientific Lab., N. Mex. Theoretical Div.
POLYACETYLENE: A REAL MATERIAL LINKING CONDENSED MATTER AND FIELD THEORY
David K. Campbell 1981 13 p refs Presented at the Conf. on Structural Elements and Statistical Mech. on Field Theory, Frieburg, West Germany, 31 Aug. - 11 Sep. 1981
(Contract W-7405-eng-36)
(DE82-006154; LA-UR-81-3636; CONF-8108108-1) Avail: NTIS HC A02/MF A01

One of the most active subjects of recent research at the interface between field theory and statistical mechanics concerns a real material that seems more properly to belong to the arcana of organic chemistry than to either field theory or statistical mechanics. The material is polyacetylene ((CH)sub x/), a quasi-one dimensional organic polymer with some very interesting and potentially exotic properties. In this discussion, a pedagogical introduction is given to some of the recent theoretical studies of polyacetylene to convey some of the reasons for the intense excitement in this area. DOE

N83-17358# Atomic Energy Research Establishment, Harwell (England). Theoretical Physics Div.
RESEARCH AT HARWELL ON NUCLEAR, ATOMIC AND MOLECULAR PHYSICS, THE THEORY OF FLUIDS, RADIATION DAMAGE, SAFETY STUDIES, POINT DEFECTS AND POINT DEFECT DETERMINED PROCESSES, SURFACE STUDIES AND NONDESTRUCTIVE EXAMINATION ARE DESCRIBED
Apr. 1981 136 p refs
(DE82-700072; AERE-PR/TP-37) Avail: NTIS (US Sales Only) HC A07/MF A01; DOE Depository Libraries

Research at Harwell on nuclear, atomic and molecular physics is described. Subjects covered are the theory of fluids, radiation damage, safety studies, point defects and point defect determined processes, surface studies, and nondestructive examination. DOE

N83-17393*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
SPIN AND GRAVITATION
John R. Ray *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 30 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20J

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N83-17359*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE 1982 NASA/ASEE SUMMER FACULTY FELLOWSHIP PROGRAM
B. F. Barfield, ed. (Alabama Univ., Tuscaloosa), Marion I. Kent, ed., James Dozier, ed., and Gerald Karr, ed. (Alabama Univ., Huntsville) Aug. 1982 862 p refs Program held in Huntsville, Ala., 1 Jun. - 6 Aug. 1982
(Grant NGT-01-002-099)
(NASA-CR-162051; NAS 1.26:162051) Avail: NTIS HC A99/MF A01 CSCL 05I

A NASA/ASEE Summer Faculty Fellowship Research Program was conducted to further the professional knowledge of qualified engineering and science faculty members, to stimulate an exchange of ideas between participants and NASA, to enrich and refresh the research and teaching activities of participants' institutions, and to contribute to the research objectives of the NASA Centers. For individual titles, see N83-17360 through N83-17402.

N83-17360*# Alabama A & M Univ., Huntsville. Dept. of Electrical Engineering Technology.
ELECTRICALLY RECONFIGURABLE LOGIC ARRAY **c60**
R. K. Agarwal *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 15 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 09B

To compose the complicated systems using algorithmically specialized logic circuits or processors, one solution is to perform relational computations such as union, division and intersection directly on hardware. These relations can be pipelined efficiently on a network of processors having an array configuration. These processors can be designed and implemented with a few simple cells. In order to determine the state-of-the-art in Electrically Reconfigurable Logic Array (ERLA), a survey of the available programmable logic array (PLA) and the logic circuit elements used in such arrays was conducted. Based on this survey some recommendations are made for ERLA devices. Author

N83-17361*# Alabama Univ., University. Dept. of Mathematics.
CONTROL POLE PLACEMENT RELATIONSHIPS **c64**
O. Richard Ainsworth *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 12 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 12A

Using a simplified Large Space Structure (LSS) model, a technique was developed which gives algebraic relationships for the unconstrained poles. The relationships, which were obtained by this technique, are functions of the structural characteristics and the control gains. Extremely interesting relationships evolve for the case when the structural damping is zero. If the damping is zero, the constrained poles are uncoupled from the structural mode shapes. These relationships, which are derived for structural damping and without structural damping, provide new insight into the migration of the unconstrained poles for the CFPPS. Author

N83-17362*# Tennessee Technological Univ., Cookeville. Dept. of Chemistry.
DEVELOPMENT OF TEST METHODOLOGY FOR DYNAMIC MECHANICAL ANALYSIS INSTRUMENTATION **c35**
Vernon R. Allen *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 24 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 14B

Dynamic mechanical analysis instrumentation was used for the development of specific test methodology in the determination of engineering parameters of selected materials, esp. plastics and elastomers, over a broad range of temperature with selected environment. The methodology for routine procedures was established with specific attention given to sample geometry, sample size, and mounting techniques. The basic software of the duPont 1090 thermal analyzer was used for data reduction which simplify the theoretical interpretation. Clamps were developed which allowed 'relative' damping during the cure cycle to be measured for the fiber-glass supported resin. The correlation of fracture energy 'toughness' (or impact strength) with the low temperature (glassy) relaxation responses for a 'rubber-modified' epoxy system was negative in result because the low-temperature dispersion mode (-80 C) of the modifier coincided with that of the epoxy matrix, making quantitative comparison unrealistic. Author

N83-17363*# Tennessee Univ. Space Inst., Tullahoma. Dept. of Engineering Science and Mechanics.
INSTABILITY OF A SOLIDIFYING BINARY MIXTURE **c25**
Basil N. Antar *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 13 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 07D

An analysis is performed on the stability of a solidifying binary mixture due to surface tension variation of the free liquid surface. The basic state solution is obtained numerically as a nonstationary function of time. Due to the time dependence of the basic state, the stability analysis is of the global type which utilizes a variational technique. Also due to the fact that the basic state is a complex function of both space and time, the stability analysis is performed through numerical means. Author

N83-17364*# Auburn Univ., Ala. Dept. of Physics and Mechanical Engineering.
PLASMA IGNITION FOR LASER PROPULSION **c36**
Raymond F. Askew *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 26 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20E

For a specific optical system a pulsed carbon dioxide laser having an energy output of up to 15 joules was used to initiate a plasma in air at one atmosphere pressure. The spatial and temporal development of the plasma were measured using a multiframe image converter camera. In addition the time dependent velocity of the laser supported plasma front which moves opposite to the direction of the laser pulse was measured in order to characterize the type of wavefront developed. Reliable and reproducible spark initiation was achieved. The lifetime of the highly dense plasma at the initial focal spot was determined to be less than 100 nanoseconds. The plasma front propagates toward the laser at a variable speed ranging from zero to 1.6 x 1,000,000 m/sec. The plasma front propagates for a total distance of approximately five centimeters for the energy and laser pulse shape employed.
Author

N83-17365*# Jackson State Univ., Miss. Dept. of General Science.
A PRELIMINARY STUDY OF ENVIRONMENTAL PARAMETERS ASSOCIATED WITH THE FEASIBILITY OF A POLYGENERATION PLANT AT KENNEDY SPACE CENTER **c45**
Grover D. Barnes *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 18 p ref (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 13B

The feasibility of a polygeneration plant at Kennedy Space Center was studied. Liquid hydrogen and gaseous nitrogen are the two principal products in consideration. Environmental parameters (air quality, water quality, biological diversity and hazardous waste disposal) necessary for the feasibility study were investigated. A National Environmental Policy Act (NEPA) project flow sheet was to be formulated for the environmental impact statement. Water quality criteria for Florida waters were to be established.
Author

N83-17366*# Vanderbilt Univ., Nashville, Tenn. Dept. of Mechanical and Materials Engineering.
CONTAINERLESS PROCESSING OF Nb-Ge ALLOYS IN A LONG DROP TUBE **c26**

Robert J. Bayuzick *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 8 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11F

The thirty-two meter drop tube at the Marshall Space Flight Center was used to study the effect of zero gravity containerless processing on the structure and properties of materials. The concept involves the suppression of heterogeneous nucleation of solid in liquid and, therefore, solidification accompanied by large degrees of undercooling. Under these conditions metastable phases can be formed or, at the very least, unique nonequilibrium microstructures (containing equilibrium phases) with unique properties can be produced. The drop tube solidification was applied to niobium base alloys with emphasis on the Nb-Ge binary system in an effort to produce metastable phases with high superconducting transition temperatures in bulk specimens. In the past, only lower Ge alloys (Nb-13 a/o, Nb-18 a/o, and Nb-22 a/o) could be undercooled. Higher Ge alloys (e.g., Nb-25 a/o Ge and Nb-27 a/o Ge) can now be undercooled on a routine basis.
Author

N83-17367*# Vanderbilt Univ., Nashville, Tenn. Dept. of Civil and Environmental Engineering.
THEORETICAL MODEL OF THE EFFECT OF CRACK TIP BLUNTING ON THE ULTIMATE TENSILE STRENGTH OF WELDS IN 2219-T87 ALUMINUM c26
Robert J. Bell *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 39 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11F

A theoretical model representing blunting of a crack tip radius through diffusion of vacancies is presented. The model serves as the basis for a computer program which calculates changes, due to successive weld heat passes, in the ultimate tensile strength of 2219-T81 aluminum. In order for the model to yield changes of the same order in the ultimate tensile strength as that observed experimentally, a crack tip radius of the order of .001 microns is required. Such sharp cracks could arise in the fusion zone of a weld from shrinkage cavities or decohered phase boundaries between dendrites and the eutectic phase, or, possibly, from plastic deformation due to thermal stresses encountered during the welding process. Microstructural observations up to X2000 (resolution of about .1 micron) did not, in the fusion zone, show structural details which changed significantly under the influence of a heat pass, with the exception of possible small changes in the configuration of the interdendritic eutectic and in porosity build-up in the remelt zone.
Author

N83-17368*# Alabama Univ., Huntsville. Dept. of Industrial and Systems Engineering.
REFLECTANCE MEASUREMENTS c74
Robert A. Brown *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 17 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20F

The productivity of spectroreflectometer equipment and operating personnel and the accuracy and sensitivity of the measurements were investigated. Increased optical sensitivity and better design of the data collection and processing scheme to eliminate some of the unnecessary present operations were conducted. Two promising approaches to increased sensitivity were identified, conventional processing with error compensation and detection of random noise modulation.
Author

N83-17369*# Texas A&M Univ., College Station. Dept. of Meteorology.
INVESTIGATION OF MESOSCALE METEOROLOGICAL PHENOMENA AS OBSERVED BY GEOSTATIONARY SATELLITE c47
Kenneth C. Brundidge *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 18 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 04B

Satellite imagery plus conventional synoptic observations were used to examine three mesoscale systems recently observed by the GOES-EAST satellite. The three systems are an arc cloud complex (ACC), mountain lee wave clouds and cloud streets parallel to the wind shear. Possible gravity-wave activity is apparent in all three cases. Of particular interest is the ACC because of its ability to interact with other mesoscale phenomena to produce or enhance convection.
Author

N83-17370*# Eastern Connecticut State College, Willimantic. Dept. of Mathematical Sciences.
FUEL OPTIMAL MANEUVERS OF SPACECRAFT ABOUT A CIRCULAR ORBIT c18
Thomas E. Carter *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 22 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 22B

Fuel optimal maneuvers of spacecraft relative to a body in circular orbit are investigated using a point mass model in which the magnitude of the thrust vector is bounded. All nonsingular optimal maneuvers consist of intervals of full thrust and coast and are found to contain at most seven such intervals in one period. Only four boundary conditions where singular solutions occur are possible. Computer simulation of optimal flight path shapes and switching functions are found for various boundary conditions. Emphasis is placed on the problem of soft rendezvous with a body in circular orbit.
Author

N83-17371*# Alabama A & M Univ., Normal. Dept. of Chemistry.
SOLIDIFICATION STUDIES OF MONOTECTIC SYSTEMS c26
Kichoon Chang *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 16 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11F

Described is an attempt to determine critical wetting temperatures in monotectic systems and to investigate the wetting phase on container walls and the phase preferential wetting of a monotectic solid.
R.J.F.

N83-17372*# College of Southern Georgia, Statesboro. Dept. of Mathematics and Computer Science.
A RECURSIVE ALGORITHM FOR ZERNIKE POLYNOMIALS c74
John W. Davenport *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 13 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20F

The analysis of a function defined on a rotationally symmetric system, with either a circular or annular pupil is discussed. In order to numerically analyze such systems it is typical to expand the given function in terms of a class of orthogonal polynomials. Because of their particular properties, the Zernike polynomials are especially suited for numerical calculations. Developed is a recursive algorithm that can be used to generate the Zernike polynomials up to a given order. The algorithm is recursively defined over J where R(J,N) is the Zernike polynomial of degree N obtained by orthogonalizing the sequence R(J), R(J+2), ..., R(J+2N) over (epsilon, 1). The terms in the preceding row - the (J-1) row - up to the N+1 term is needed for generating the (J,N)th term. Thus, the algorith generates an upper left-triangular table. This algorithm was placed in the computer with the necessary support program also included.
R.J.F.

N83-17373*# Alabama Univ., Huntsville. Dept. of Physics.
CHROMIUM ION PLATING STUDIES FOR ENHANCEMENT OF BEARING LIFETIME c37
Jack H. Davis *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 8 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 13I

Six 440-C hardened stainless steel roller bearing test rods were ion plated with various chromium films of thicknesses from .2 microns to 7 microns. The thinner (approximately .2 microns)

coating sample had 3 times the fatigue life of the unplated (standard) specimens. Contrastingly, the samples having thicker coatings (several microns) had short fatigue lives (about 3% of the unplated standard). R.J.F.

N83-17374*# Alabama Univ., Tuscaloosa. Dept. of Electrical Engineering.
ORIGIN AND CONTROL OF INSTABILITY IN SCR/TRIAC THREE-PHASE MOTOR CONTROLLERS **c33**
John J. Dearth *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 30 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 09A

The energy savings and reactive power reduction functions initiated by the power factor controller (PFC) are discussed. A three-phase PFC with soft start is examined analytically and experimentally to determine how well it controls the open loop instability and other possible modes of instability. The detailed mechanism of the open loop instability is determined and shown to impose design constraints on the closed loop system. The design is shown to meet those constraints. R.J.F.

N83-17375*# Auburn Univ., Ala. Dept. of Mathematics.
A SCHEDULING ALGORITHM FOR SPACELAB TELESCOPE OBSERVATIONS **c61**
Bob Grone *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 09B

An algorithm is developed for sequencing and scheduling of observations of stellar targets by equipment on Spacelab. The method is a general one. The scheduling problem is defined and examined. The method developed for its solution is documented. Suggestions for further development and implementation of this method are made. R.J.F.

N83-17376*# Tulsa Univ., Okla. Dept. of Electrical Engineering.
SHAPE CONTROL OF LARGE SPACE STRUCTURES **c18**
Martin T. Hagan *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 28 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 22B

A survey has been conducted to determine the types of control strategies which have been proposed for controlling the vibrations in large space structures. From this survey several representative control strategies were singled out for detailed analyses. The application of these strategies to a simplified model of a large space structure has been simulated. These simulations demonstrate the implementation of the control algorithms and provide a basis for a preliminary comparison of their suitability for large space structure control. Author

N83-17377*# Mississippi State Univ., Mississippi State. Dept. of Chemical Engineering.
STRUCTURAL APPLICATION OF HIGH STRENGTH, HIGH TEMPERATURE CERAMICS **c27**
William B. Hall *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 11 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11B

The operation of rocket engine turbine pumps is limited by the temperature restrictions of metallic components used in the systems. Mechanical strength and stability of these metallic components decrease drastically at elevated temperatures. Ceramic materials that retain high strength at high temperatures appear to be a feasible alternate material for use in the hot end of the turbopumps. This project identified and defined the processing parameters that affected the properties of Si3N4, one of candidate ceramic materials. Apparatus was assembled and put into operation to hot press Si3N4 powders into bulk material for in house evaluation. A work statement was completed to seek outside contract services to design, manufacture, and evaluate Si3N4 components in the service environments that exists in SSME turbopumps. Author

N83-17378*# Alabama Univ., University. Dept. of Physics and Astronomy.
HYDRODYNAMIC STABILITY OF JETS PRODUCED BY MASS ACCRETING SYSTEMS **c89**
Philip E. Hardee *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 12 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 03A

The existing model for pulsed X-ray emission from the source Hercules X-1 is reviewed. A necessary part of this model is a processing accretion disk which turns the source on and off with 35 day cycle. It is usually assumed that precession of the primary star in this binary system, Hz Hercules, slaves the disk to its precession rate. This model can account for the system behavior in a qualitative manner. Precession of Hz Hercules with 35 day period requires precession of the binary orbit. Pulse arrival times from Herc X-1 have been analyzed for orbital precession. The inclusion of precession does not significantly improve the results obtained assuming a non-precessing orbit. The fluid dynamical stability of extra-galactic jets and the possible consequences of Kelvin-Helmholtz instability at the jet surface external medium interface are considered. B.W.

N83-17379*# Alabama Univ., University. Dept. of Physics and Astronomy.
EFFECTS OF THE KELVIN-HELMHOLTZ SURFACE INSTABILITY ON SUPERSONIC JETS **c02**
Philip E. Hardee *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 23 p refs Submitted for publication (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 01A

An exact numerical calculation is provided for of linear growth and phase velocity of Kelvin-Helmholtz unstable wave modes on a supersonic jet of cylindrical cross section. An expression for the maximally unstable wavenumber of each wave mode is found. Provided a sharp velocity discontinuity exists all wave modes are unstable. A combination of rapid jet expansion and velocity shear across a jet can effectively stabilize all wave modes. The more likely case of slow jet expansion and of velocity shear at the jet surface allows wave modes with maximally unstable wavelength longer than or on the order of the jet radius to grow. The relative energy in different wave modes and effect on the jet is investigated. Energy input into a jet resulting from surface instability is discussed. B.W.

N83-17380*# Washington State Univ., Pullman. Dept. of Mechanical Engineering.
FINITE ELEMENT ANALYSIS OF A DEPLOYABLE SPACE STRUCTURE **c39**
David V. Hutton *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20K

To assess the dynamic characteristics of a deployable space truss, a finite element model of the Scientific Applications Space Platform (SASP) truss has been formulated. The model incorporates all additional degrees of freedom associated with the pin-jointed members. Comparison of results with SPAR models of the truss show that the joints of the deployable truss significantly affect the vibrational modes of the structure only if the truss is relatively short. Author

N83-17381*# Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.
THERMAL RADIATION VIEW FACTOR: METHODS, ACCURACY AND COMPUTER-AIDED PROCEDURES **c34**
Prasanna V. Kadaba *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 58 p refs (For primary document see N83-17359 07-80)

Avail: NTIS HC A99/MF A01 CSCL 20D

The computer aided thermal analysis programs which predicts the result of predetermined acceptable temperature range prior to stationing of these orbiting equipment in various attitudes with respect to the Sun and the Earth was examined. Complexity of the surface geometries suggests the use of numerical schemes for the determination of these viewfactors. Basic definitions and standard methods which form the basis for various digital computer methods and various numerical methods are presented. The physical model and the mathematical methods on which a number of available programs are built are summarized. The strength and the weaknesses of the methods employed, the accuracy of the calculations and the time required for computations are evaluated. The situations where accuracies are important for energy calculations are identified and methods to save computational times are proposed. Guide to best use of the available programs at several centers and the future choices for efficient use of digital computers are included in the recommendations. E.A.K.

N83-17382*# University of Eastern Kentucky, Richmond. Dept. of Physics and Astronomy.

STUDIES OF NEUTRON AND PROTON NUCLEAR ACTIVATION IN LOW-EARTH ORBIT **c72**

C. E. Laird *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 16 p refs (For primary document see N83-17359 07-80)

Avail: NTIS HC A99/MF A01 CSCL 20H

The expected induced radioactivity of experimental material in low Earth orbit was studied for characteristics of activating particles such as cosmic rays, high energy Earth albedo neutrons, trapped protons, and secondary protons and neutrons. The activation cross sections for the production of long lived radioisotopes and other existing nuclear data appropriate to the study of these reactions were compiled. Computer codes which are required to calculate the expected activation of orbited materials were developed. The decreased computer code used to predict the activation of trapped protons of materials placed in the expected orbits of LDEF and Spacelab II. Techniques for unfolding the fluxes of activating particles from the measured activation of orbited materials are examined. E.A.K.

N83-17383*# Missouri Univ., Rolla. Dept. of Metallurgical Engineering.

THE MEASUREMENT OF THE STACKING FAULT ENERGY IN COPPER, NICKEL AND COPPER-NICKEL ALLOYS **c26**

H. P. Leighly, Jr. *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 8 p refs (For primary document see N83-17359 07-80)

Avail: NTIS HC A99/MF A01 CSCL 11F

The relationship of hydrogen solubility and the hydrogen embrittlement of high strength, high performance face centered cubic alloys to the stacking fault energy of the alloys was investigated. The stacking fault energy is inversely related to the distance between the two partial dislocations which are formed by the dissociation of a perfect dislocation. The two partial dislocations define a stacking fault in the crystal which offers a region for hydrogen segregation. The distance between the partial dislocations is measured by weak beam, dark field transmission electron microscopy. The stacking fault energy is calculated. Pure copper, pure nickel and copper-nickel single crystals are used to determine the stacking fault energy. E.A.K.

N83-17384*# Tuskegee Inst., Ala. Dept. of Chemistry.

ULTRAHIGH MOLECULAR WEIGHT AROMATIC SILOXANE POLYMERS **c27**

Larry M. Ludwick *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 13 p refs (For primary document see N83-17359 07-80)

Avail: NTIS HC A99/MF A01 CSCL 11G

The condensation of a diol with a silane in toluene yields a silphenylene-siloxane polymer. The reaction of stiochiometric amounts of the diol and silane produced products with molecular weights in the range 2.0 - 6.0 x 10 to the 5th power. The molecular weight of the product was greatly increased by a multistep technique. The methodology for synthesis of high molecular weight polymers using a two step procedure was refined. Polymers with weight average molecular weights in excess of 1.0 x 10 to the 6th power produced by this method. Two more reactive silanes, bis(pyrrolidinyl)dimethylsilane and bis(gamma butyrolactam) dimethylsilane, are compared with the dimethyleminodimethylsilane in ability to advance the molecular weight of the prepolymer. The polymers produced are characterized by intrinsic viscosity in tetrahydrofuran. Weight and number average molecular weights and polydispersity are determined by gel permeation chromatography. E.A.K.

N83-17385*# Mississippi Univ., University. Dept. of Physics and Astronomy.

IN SITU MEASUREMENTS OF THUNDERSTORM ELECTRICAL PROPERTIES **c47**

Thomas C. Marshall *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 6 p refs (For primary document see N83-17359 07-80)

Avail: NTIS HC A99/MF A01 CSCL 04B

An airplane sensor to measure the charge, size and two dimensional shape of precipitation particles and large cloud particles was developed. The basic design of the instrument includes: the transducers and analog electronics, the analog to digital conversion electronics and a microprocessor based system to run the electronics and load the digital data onto magnetic tape. Prototype instrumentation for the proposed lightning mapper satellite was tested by flying it in a U-2 aircraft over severe storms in Oklahoma. Flight data are compared to data from ground based instruments. E.A.K.

N83-17386*# Middle Tennessee State Univ., Murfreesboro. Dept. of Mathematics and Computer Science.

POPULATION CONTROL OF SELF-REPLICATING SYSTEMS **c64**

Richard L. McCord *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 12 p refs (For primary document see N83-17359 07-80)

Avail: NTIS HC A99/MF A01 CSCL 12A

The literature concerning fibonacci sequence and the mathematics of self replication are reviewed. One option allows each primary to generate n-replicas, one in each sequential time frame after its own generation with no restrictions on the number of ancestors per replica. The state vector of the replicas in an efficient manner is determined. Option-B has a fixed number of replicas per primary and no restrictions on the number of ancestors for a replica. Any element fij represents the number of elements of type-j in time frame k+1 generated from type-i in time frame k. Option-D is a diagonal matrix whose eigenvalues are precisely those of f. E.A.K.

N83-17387*# Berry Coll., Mount Berry, Ga. Dept. of Physics.

STUDY OF AND PROPOSALS FOR THE CORRECTION OF ERRORS IN A RADAR RANGING DEVICE DESIGNED TO FACILITATE DOCKING OF A TELEOPERATOR MANEUVERING SYSTEM **c32**

Malcolm W. McDonald *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 17 p refs (For primary document see N83-17359 07-80)

Avail: NTIS HC A99/MF A01 CSCL 17I

A frequency modulated continuous wave radar system was developed. The system operates in the 35 gigahertz frequency range and provides millimeter accuracy range and range rate measurements. This level of range resolution allows soft docking for the proposed teleoperator maneuvering system (TMS) or other autonomous or robotic space vehicles. Sources of error in the operation of the system which tend to limit its range resolution capabilities are identified. Alternative signal processing techniques are explored with emphasis on determination of the effects of inserting various signal filtering circuits in the system. The identification and elimination of an extraneous low frequency signal component created as a result of zero range immediate reflection

of radar energy from the surface of the antenna dish back into the mixer of the system is described. E.A.K.

N83-17388*# Alabama Univ., Huntsville. Dept. of Chemistry.
PRODUCTION OF METAL PARTICLES AND CLUSTERS c25
Samuel P. McManus *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 11 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 07D

The feasibility of producing novel metals or metal clusters in a low gravity environment was studied. The production of coordinately unsaturated metal carbonyls by thermolysis or photolysis of stable metal carbonyls has the potential to generate novel catalysts by this technique. Laser irradiation of available metal carbonyls was investigated. It is found that laser induced decomposition of metal carbonyls is feasible for producing a variety of coordinately unsaturated species. Formation of clustered species does occur but is hampered by weak metal-metal bonds. E.A.K.

N83-17389*# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.
AGEOSTROPHIC WINDS IN THE SEVERE STROM ENVIRONMENT c47
James T. Moore *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 04B

The period from 1200 GMT 10 April to 0000 GMT 11 April 1979, during which time several major tornadoes and severe thunderstorms, including the Wichita Falls tornado occurred was studied. A time adjusted, isentropic data set was used to analyze key parameters. Fourth order centered finite differences were used to compute the isallobaric, inertial advective, tendency, inertial advective geostrophic and ageostrophic winds. Explicit isentropic trajectories were computed through the isentropic, inviscid equations of motion using a 15 minute time step. Ageostrophic, geostrophic and total vertical motion fields were computed to judge the relative importance of ageostrophy in enhancing the vertical motion field. It is found that ageostrophy is symptomatic of those mass adjustments which take place during upper level jet streak propagation and can, in a favorable environment, act to increase and release potential instability over meso alpha time periods. E.A.K.

N83-17390*# South Carolina State Coll., Orangeburg. Dept. of Natural Sciences.
FABRICATION TECHNIQUES FOR SUPERCONDUCTING READOUT LOOPS c76
James E. Payne *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 16 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20L

Procedures for the fabrication of superconducting readout loops out of niobium on glass substrates were developed. A computer program for an existing fabrication system was developed. Both positive and negative resist procedures for the production of the readout loops were investigated. Methods used to produce satisfactory loops are described and the various parameters affecting the performance of the loops are analyzed. E.A.K.

N83-17391*# South Carolina State Coll., Orangeburg. Dept. of Natural Sciences.
OPTICAL CONTACTING OF QUARTZ c74
Linda L. Payne *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 9 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20F

The strength of the bond between optically contacted quartz surfaces was investigated. The Gravity Probe-B (GP-B) experiment to test the theories of general relativity requires extremely precise measurements. The quartz components of the instruments to make these measurements must be held together in a very stable unit. Optical contacting is suggested as a possible method of joining these components. The fundamental forces involved in optical contacting are reviewed and relates calculations of these forces to the results obtained in experiments. E.A.K.

N83-17392*# Tennessee Univ. Space Inst., Tullahoma. Dept. of Electrical Engineering.
THE APPLICATION OF DIGITAL SIGNAL PROCESSING TECHNIQUES TO A TELEOPERATOR RADAR SYSTEM c32
Alfonso Pujol *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 17I

A digital signal processing system was studied for the determination of the spectral frequency distribution of echo signals from a teleoperator radar system. The system consisted of a sample and hold circuit, an analog to digital converter, a digital filter, and a Fast Fourier Transform. The system is interfaced to a 16 bit microprocessor. The microprocessor is programmed to control the complete digital signal processing. The digital filtering and Fast Fourier Transform functions are implemented by a S2815 digital filter/utility peripheral chip and a S2814A Fast Fourier Transform chip. The S2815 initially simulates a low-pass Butterworth filter with later expansion to complete filter circuit (bandpass and highpass) synthesizing. M.G.

N83-17393*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
SPIN AND GRAVITATION c77
John R. Ray *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 30 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20J

The fundamental variational principle for a perfect fluid in general relativity is extended so that it applies to the metric-torsion Einstein-Cartan theory. Field equations for a perfect fluid in the Einstein-Cartan theory are deduced. In addition, the equations of motion for a fluid with intrinsic spin in general relativity are deduced from a special relativistic variational principle. The theory is a direct extension of the theory of nonspinning fluids in special relativity. M.G.

N83-17394*# Alabama Univ., Huntsville. Dept. of Psychology.
AUTONOMOUS ONBOARD CREW OPERATIONS: A REVIEW AND DEVELOPMENTAL APPROACH c54
Jon G. Rogers *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 29 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 05H

A review of the literature generated by an intercenter mission approach and consolidation team and their contractors was performed to obtain background information on the development of autonomous operations concepts for future space shuttle and space platform missions. The Boeing 757/767 flight management system was examined to determine the relevance for transfer of the developmental approach and technology to the performance of the crew operations function. In specific, the engine indications and crew alerting system was studied to determine the relevance of this display for the performance of crew operations onboard the vehicle. It was concluded that the developmental approach and technology utilized in the aeronautics industry would be appropriate for development of an autonomous operations concept for the space platform. M.G.

N83-17395*# Alabama Univ., Huntsville. Dept. of Physics.
EXPERIMENTAL STUDY OF TIME-DEPENDENT FLOWS IN LABORATORY ATMOSPHERIC FLOW MODELS c34
J. E. Rush *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 22 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20D

Baroclinic waves in a rotating, differentially-heated annulus of liquid were studied in support of the Atmospheric General Circulation Experiment. Specific objectives were to determine:

(1) the nature of the flow at shallow depths, (2) the effect of a rigid lid vs. free surface, and (3) the nature of fluctuations in the waves as a function of rotation rate, depth, and type of surface. It is found that flows with a rigid lid are basically the same as those with a free surface, except for a decrease in flow rate. At shallow depths steady flows are found in essentially the same form, but the incidence of unsteady flows is greatly diminished. M.G.

N83-17396*# Alabama Univ., Huntsville. Dept. of Mathematics.
A MARKOV CHAIN MODEL FOR RELIABILITY GROWTH AND DECAY **c64**
Kyle Siegrist *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 22 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 12A

A mathematical model is developed to describe a complex system undergoing a sequence of trials in which there is interaction between the internal states of the system and the outcomes of the trials. For example, the model might describe a system undergoing testing that is redesigned after each failure. The basic assumptions for the model are that the state of the system after a trial depends probabilistically only on the state before the trial and on the outcome of the trial and that the outcome of a trial depends probabilistically only on the state of the system before the trial. It is shown that under these basic assumptions, the successive states form a Markov chain and the successive states and outcomes jointly form a Markov chain. General results are obtained for the transition probabilities, steady-state distributions, etc. A special case studied in detail describes a system that has two possible state ('repaired' and 'unrepaired') undergoing trials that have three possible outcomes ('inherent failure', 'assignable-cause' 'failure' and 'success'). For this model, the reliability function is computed explicitly and an optimal repair policy is obtained. M.G.

N83-17397*# University of Western Kentucky, Bowling Green. Dept. of Physics and Astronomy.
MAGNETOSPHERIC RAY TRACING STUDIES **c46**
N. Frank Six *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 19 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 03B

Using a model of Jupiter's magnetized plasma environment, radiation raypaths were calculated with a three-dimension ray tracing program. It is assumed that energetic particles produce the emission in the planet's auroral zone at frequencies just above the electron gyrofrequencies. This radiation is generated in narrow sheets defined by the angle of a ray with respect to the magnetic field line. By specifying the source position: latitude, longitude, and radial distance from the planet, signatures in the spectrum of frequency versus time seen by Voyager 1 and 2 were duplicated. The frequency range and the curvature of the decametric arcs in these dynamic spectra are the result of the geometry of the radiation sheets (imposed by the plasma and by the B-field) and illumination of Voyager 1 and 2 as the rotating magnetosphere mimics a pulsar. M.G.

N83-17398*# Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
MODIFICATION AND EVALUATION OF A BARNES-TYPE OBJECTIVE ANALYSIS SCHEME FOR SURFACE METEOROLOGICAL DATA **c47**
David R. Smith *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 23 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 04B

The Purdue Regional Objective Analysis of the Mesoscale (PROAM) is a Barness-type scheme for the analysis of surface meteorological data. Modifications are introduced to the original version in order to increase its flexibility and to permit greater ease of usage. The code was rewritten for an interactive computer environment. Furthermore, a multiple iteration technique suggested by Barnes was implemented for greater accuracy. PROAM was subjected to a series of experiments in order to evaluate its performance under a variety of analysis conditions. The tests include use of a known analytic temperature distribution in order to quantify error bounds for the scheme. Similar experiments were conducted using actual atmospheric data. Results indicate that the multiple iteration technique increases the accuracy of the analysis. Furthermore, the tests verify appropriate values for the analysis parameters in resolving meso-beta scale phenomena. M.G.

N83-17399*# Alabama A & M Univ., Normal. Dept. of Engineering Technology.
AN ANALYSIS OF NICKEL CADMIUM BATTERIES **c44**
J. B. Turner, Jr. *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 11 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 10C

Temperature effects, reconditioning, divergencies, capacity, charge rates, depth of discharge, and cell matching and their effects on battery life are discussed. The development of a practical strategy for predicting battery life by subjecting cells to simulated cyclic operation is also addressed. M.G.

N83-17400*# Alabama A & M Univ., Normal. Dept. of Physics.
INVESTIGATION OF COMPOSITIONAL SEGREGATION DURING UNIDIRECTIONAL SOLIDIFICATION OF SOLID SOLUTION SEMICONDUCTING ALLOYS **c26**
Jai-Ching Wang *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 20 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 11F

Compositional segregation of solid solution semiconducting alloys in the radial direction during unidirectional solidification was investigated by calculating the effect of a curved solid liquid interface on solute concentration at the interface on the solid. The formulation is similar to that given by Coriell, Boisvert, Rehm, and Sekerka except that a more realistic cylindrical coordinate system which is moving with the interface is used. Analytical results were obtained for very small and very large values of beta with beta = VR/D, where V is the velocity of solidification, R the radius of the specimen, and D the diffusivity of solute in the liquid. For both very small and very large beta, the solute concentration at the interface in the solid C(si) approaches C(o) (original solute concentration) i.e., the deviation is minimal. The maximum deviation of C(si) from C(o) occurs for some intermediate value of beta. M.G.

N83-17401*# Alabama A & M Univ., Normal. Dept. of Physics.
THE STUDY OF X-RAY SCATTERING TO DETERMINE SURFACE TOPOGRAPHY OF SMOOTH SURFACES **c74**
Alton C. Williams *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 24 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 20F

The scattering of X-rays from state-of-the-art polished mirrors is discussed with reference to the requirements of the Advanced X-ray Astrophysics Facility telescope. An experimental set-up is described which allows information to be obtained with subarcsecond resolution. A sample of the data obtained is presented along with a possible theoretical model for its interpretation. M.G.

N83-17402*# Calhoun Community Coll., Decatur, Ala. Dept. of Natural Sciences.
STUDIES WITH SAMPLE CONDUCTIVITY, INSERTION RATES, AND PARTICLE DEFLECTION IN A CONTINUOUS FLOW ELECTROPHORESIS SYSTEM **c25**
George Williams, Jr. *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 25 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 07D

The continuous flow electrophoresis system makes electrophoresis possible in a free-flowing film of aqueous electrolyte medium. The sample continuously enters the electrolyte at the top of the

chamber and is subjected to the action of a lateral dc field. This divides the sample into fractions since each component has a distinctive electrophoretic mobility. Tests were made using monodisperse polystyrene latex microspheres to determine optimum sample conductivity, insertion rates and optimum electric field applications as baseline data for future STS flight experiments. Optimum sample flow rates for the selected samples were determined to be approximately 26 micro-liters/min. Experiments with samples in deionized water yielded best results and voltages in the 20 V/cm to 30 V/cm range were optimum. Deflections of formaldehyde fixed turkey and bovine erythrocytes were determined using the continuous flow electrophoresis system. The effects of particle interactions on sample resolution and migration in the chamber was also evaluated. M.G.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N83-17403# Army Industrial Base Engineering Activity, Rock Island, Ill.
MANUFACTURING METHODS AND TECHNOLOGY PROGRAM PLAN FY 1982 Annual Report
Gaylen Fischer Sep. 1982 136 p
(AD-A120274) Avail: NTIS HC A07/MF A01 CSCL 05/1

The manufacturing methods and technology (MMT) program serves the US Army materiel development and readiness command (DARCOM) as a bridge between research and development and production. The program's primary aim is to reduce the cost of weapons system acquisition by improving the efficiency of manufacturing processes and by implementing new technology. Although cost reduction is a primary concern, the emphasis is also directed toward efforts reducing air and water pollution, increasing safety, conserving energy, reducing dependency on critical material, improving producibility and increasing productivity. The MMT Program Plan, CY 1982, provides within a single source a summary of current and near term efforts (FY82-FY86) included in the DARCOM MMI Program. Since weapons systems requirements and the technology for these systems are constantly changing, inclusion in the Program Plan is not a guarantee that an individual project will be funded. However, the Plan does serve as an indicator of the areas towards which DARCOM's resources will be directed and the magnitude of the Army's commitment to this program. GRA

N83-17404# Sandia Labs., Livermore, Calif.
A GUIDE FOR PREPARING SAFE OPERATING PROCEDURES (SOPS)
T. K. Devlin, D. E. Patrician, H. Lucas, R. A. Ware, D. A. Wright, and J. Izzo Oct. 1981 16 p
(Contract DE-AC04-76DP-00789)
(DE82-003874; SAND-81-8032) Avail: NTIS HC A02/MF A01

Sandia National Laboratories' Safe Operating Procedures (SOP) are written for activities that involve the use of explosives, dangerous chemicals, radioactive materials, hazardous systems, and for certain types of operational facilities that present hazards. This guide states SOP requirements for Sandia Livermore in detail and gives a format for writing an SOP. DOE

N83-17405# Sandia Labs., Albuquerque, N. Mex. Quality Assurance Advanced Planning Div.
SAMPLE PRESELECTION PROCESS DESIGNED TO ENHANCE EARLY PLANNING INFORMATION
Frank W. Mueller and Floyd W. Spencer Nov. 1981 15 p
(Contract DE-AC04-76DP-00789)
(DE82-005115; SAND-81-1200) Avail: NTIS HC A02/MF A01

The DOE provides for the continuing evaluation of the nuclear weapon stockpiles through a stockpile sampling program in which randomly selected weapons are withdrawn for testing from the stockpiles each year. For some time, DOE has used a preselection scheme to obtain early identification of certain characteristics of the sample weapons for planning purposes, but which does so without jeopardizing the necessary randomization of sample selection. A DOE desire for additional and more detailed planning information to minimize weapon movements has led to an improvement of the original preselection scheme that enhances the planning information and its accuracy, while still preserving randomization. DOE

N83-17406# Oak Ridge National Lab., Tenn.
DISTRIBUTED RESOURCE MANAGEMENT: DEADLOCKS
R. W. Hayes 1981 5 p refs Presented at the Fall DECUS Symp., Los Angeles, 7 Dec. 1981
(Contract W-7405-eng-26)
(DE82-005193; CONF-811214-6) Avail: NTIS HC A02/MF A01

Many applications require data base management without the need for an entire data base management system. Also, most simple locking mechanisms are not adequate for real time data acquisition and control applications. A basic resource management mechanism which acts as a traffic cop to control access to shared data bases in a real time system is presented. This mechanism makes use of a deadlock avoidance algorithm to resolve allocation conflicts. The concept of resource management is developed and the problem of system deadlocking is described. Alternatives to the deadlock problem are presented for real time systems and a modified deadlock avoidance algorithm is developed to provide efficient resource allocation. This algorithm is implemented on an RSX-11M system and is designed for easy expansion to distributed systems. A basic approach to distributed resource management is also presented. DOE

N83-17407# European Space Agency, Paris (France).
REFLECTIONS ON EUROPE IN SPACE. THE FIRST TWO DECADES AND BEYOND In ENGLISH and FRENCH
A. Dattner Mar. 1982 45 p
(ESA-BR-10; ISSN-0250-1589) Avail: NTIS HC A03/MF A01; ESA, Paris FF 55 (Member States, AU, CN and NO) + 20% others

The history of ESA since the 1960's is summarized. Changes in organizational structure and scientific activity are described. The ERS-1, Spacelab, communications satellite, and Ariane programs are outlined. Author (ESA)

N83-17408# Vrije Universiteit, Amsterdam (Netherlands). Faculty of Mathematics and Natural Sciences.
MODELS OF KNOW-HOW AND TECHNICS TRANSFER IN THE INTERNATIONAL ORDER
F. Henry Brookman 1982 48 p refs Presented at the 12th IPSA World Congr., Rio de Janeiro, 9-14 Aug. 1982
(PB82-261025; Rept-82:1) Avail: NTIS HC A03/MF A01 CSCL 05A

The report explains and evaluates the methods of technology transfer, particularly those methods used to transfer technology to less developed countries. GRA

N83-17409# National Science Foundation, Washington, D.C. Universities and Nonprofit Institutions Studies Group.
ACADEMIC SCIENCE: R AND D FUNDS, FISCAL YEAR 1980 (DETAILED STATISTICAL TABLES). SURVEYS OF SCIENCE RESOURCES SERIES Annual Report, FY 1980
Apr. 1982 124 p
(PB82-263724; NSF-82-300) Avail: NTIS HC A06/MF A01 CSCL 05A

The publication contains tabular data on 563 institutions of higher education regarding scientific and engineering (S/E) R&D expenditures that are separately budgeted (current-fund) expenditures budgeted and restricted specifically to R&D activities during the subject fiscal year). Data are the product of the National Science Foundation's annual Survey of Scientific and Engineering Expenditures at Universities and Colleges, FY 1980. The survey is confined to institutions offering doctoral or master's degrees in academic S/E programs having $50,000 or more in separately budgeted R&D expenditures. Data are tabulated by: (1) Source of funds;

(2) by S/E discipline; (3) character of work; (4) control of institution (public/private); (5) highest degree offered; and (6) largest performers ranking. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N83-17410*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE FISCAL YEAR 1982 SCIENTIFIC AND TECHNICAL REPORTS, ARTICLES, PAPERS AND PRESENTATIONS
Sarah S. Thacker, comp. Oct. 1982 55 p
(NASA-TM-82504; NAS 1.15:82504) Avail: NTIS HC A04/MF A01 CSCL 05B

Formal NASA technical report papers published in technical journals, and presentations by MSFC personnel in FY 82 are presented. Papers of MSFC contractors are included. Author

N83-17411*# OAO Corp., Greenbelt, Md.
RESULTS OF THE SPATIAL RESOLUTION SIMULATION FOR MULTISPECTRAL DATA (RESOLUTION BROCHURES) Final Report
19 Feb. 1982 50 p
(Contract NASw-3358)
(NASA-CR-169803; NAS 1.26:169803) Avail: NTIS HC A03/MF A01 CSCL 05B

The variable information content of Earth Resource products at different levels of spatial resolution and in different spectral bands is addressed. A low-cost brochure that scientists and laymen could use to visualize the effects of increasing the spatial resolution of multispectral scanner images was produced. Author

N83-17412*# OAO Corp., Beltsville, Md.
THE EVALUATION OF OSTA'S APT AND ASVT PROGRAMS Final Report
3 Apr. 1981 83 p
(Contract NASw-3358)
(NASA-CR-169772; NAS 1.26:169772) Avail: NTIS HC A05/MF A01 CSCL 05B

The results of an evaluation of NASA's Applications Pilot Test (APT) and Applications System Verification and Transfer (AVST) Programs are presented. These programs sponsor cooperative projects between NASA and potential users of remote sensing (primarily LANDSAT) technology from federal and state government and the private sector. Fifteen specific projects, seven APT's and eight ASVT's, are examined as mechanisms for technology development, test, and transfer by comparing their results against stated objectives. Interviews with project managers from NASA field centers and user agency representatives provide the basis for project evaluation from NASA and user perspectives. Author

N83-17413*# OAO Corp., Greenbelt, Md.
DOCUMENT MANAGEMENT FOR THE ENVIRONMENTAL OBSERVATION DIVISION
Oct. 1981 19 p
(Contract NAsw-3358)
(NASA-CR-169775; NAS 1.26:169775; OAO/SD-81/0020) Avail: NTIS HC A02/MF A01 CSCL 05B

A system which sorts, catalogs, files (stores), and references planning, funding, coordinating, monitoring, and reporting documents is described. Author

N83-17414*# OAO Corp., Greenbelt, Md.
THE NON-FEDERAL OCEANOGRAPHIC COMMUNITY: AN OVERVIEW
Martin A. Swetnick Nov. 1981 181 p
(Contract NASw-3358)
(NASA-CR-169802; NAS 1.26:169802; OAO/TR-81/0056) Avail: NTIS HC A09/MF A01 CSCL 05B

A portion of the broad domestic non-Federal oceanographic community that represents a potential market for satellite remote sensor derived oceanographic data and/or marine environmental information is presented. The overview consists of listings of individuals and/or organizations who have used, or are likely to use such data or information for scientific research, offshore engineering purposes, marine resources exploration and utilization, marine related operational applications, or coastal zone management. S.L.

N83-17415*# OAO Corp., Beltsville, Md.
OSTA COMMONALITY ANALYSIS, VOLUME 1 Final Report
1 Jun. 1981 240 p refs 2 Vol.
(Contract NASw-3358)
(NASA-CR-169805; NAS 1.26:169805; OAO/TR-81/0019-Vol-1) Avail: NTIS HC A11/MF A01 CSCL 05B

The NASA End-to-End Data System (NEEDS) concept to achieve the required improvement in data systems capability where this activity may be subdivided into a logical set of development activities is reviewed. Author

N83-17416*# OAO Corp., Beltsville, Md.
OSTA COMMONALITY ANALYSIS, VOLUME 2 Final Report
E. G. Stolarik 1 Jun. 1981 912 p 2 Vol.
(Contract NASw-3358)
(NASA-CR-169806; NAS 1.26:169806; OAO/TR-81/0019-Vol-2) Avail: NTIS HC A99/MF A01 CSCL 05B

The 13 OSTA disciplines are examined and the applications being performed under each discipline and the parameter requirements associated with the various applications are identified. It contains a variety of printouts from the commonality database built using DRS on the Vax. It also shows commonality of parameter requirements by discipline and by application. Author

N83-17417# Stanford Univ., Calif. Dept. of Computer Science.
AN APPROACH TO VERIFYING COMPLETENESS AND CONSISTENCY IN A RULE-BASED EXPERT SYSTEM
Motoi Suwa (Electrotechnical Lab., Ibaraki, Japan), A. Carlisle Scott, and Edward H. Shortliffe Aug. 1982 26 p refs
(Contract N00014-81-K-0004; Grants NSF MCS-79-0353; PHS-RR-00785; PHS-LM-03395; PHS-LM-00048)
(AD-A120806; SU-STAN-CS-82-922) Avail: NTIS HC A03/MF A01 CSCL 09/4

We describe a program for verifying that a set of rules in an expert system comprehensively spans the knowledge of a specialized domain. The program has been devised and tested within the context of the ONCOCIN System, a rule-based consultant for clinical oncology. The stylized format of ONCOCIN's rules has allowed the automatic detection of a number of common errors as the knowledge base has been developed. This capability suggests a general mechanism for correcting many problems with knowledge base completeness and consistency before they can cause performance errors. GRA

N83-17418# Naval Postgraduate School, Monterey, Calif.
DISTRIBUTED DATABASE MANAGEMENT SYSTEM RECOVERY FROM NETWORK PARTITIONING M.S. Thesis
Eduardo E. Bresani Jun. 1982 90 p refs
(AD-A120400) Avail: NTIS HC A05/MF A01 CSCL 09/2

The purpose of this thesis is to analyze the operation of a distributed database management system under network partitions, review a number of existing methods proposed to deal with this problem and to present an alternate approach that will allow multiple operating partitions upon network partitioning. When a network that supports a distributed database with redundant data becomes partitioned, each partition may function separately. Due to this, independent updates at each partition may cause inconsistencies to arise. At network reconnection time such divergent data, in particular copies of the same data in different partitions have to be reconciled. There is no known general method for doing so.

Existing solutions are often unacceptable because system availability is reduced. Two recently proposed methods that allow continuous operation of multiple partitions may work for certain applications but are not general enough. GRA

N83-17419# Aerospace Corp., El Segundo, Calif. Guidance and Control Div.
THE USE OF INFLUENCE FUNCTIONS FOR OUTLIER DETECTION AND DATA EDITING Final Report
M. R. Chernick and V. K. Murthy 15 Sep. 1982 23 p refs
(Contract F04701-81-C-0082)
(AD-A120561; TR-0082(9990)-4; SD-TR-82-65) Avail: NTIS HC A02/MF A01 CSCL 12/1

Hampel's influence function (J. Amer. Statist. Assoc. 69, pp. 383-393) has been used in recent years for evaluating robust estimators, detecting outliers, computing asymptotic variances for estimators, and for hypothesis testing. In this report, the use of influence functions for various parameters is proposed, not only as a tool for outlier detection, but also as a method for replacing outliers and/or missing observations. This approach is illustrated on the estimation for the variance of a distribution and it is pointed out how the method can be applied in simple linear regression problems. This approach can be extended to more complex regression type applications such as the estimation of the orbit parameters of a satellite. GRA

N83-17420# Oak Ridge National Lab., Tenn. Nuclear Waste Programs.
INTEGRATED DATA BASE PROGRAM
Karl J. Notz 1981 11 p refs Presented at the 3rd Ann. DOE Participants Inform. Meeting on Low-Level Waste Management, New Orleans, 4 Nov. 1981
(Contract W-7405-eng-26)
(DE82-004118; CONF-811130-14) Avail: NTIS HC A02/MF A01

The IDB Program provides direct support to the DOE Nuclear Waste Management and Fuel Cycle Programs and their lead sites and support contractors by providing and maintaining a current, integrated data base of spent fuel and radioactive waste inventories and projections. All major waste types (HLW, TRU, and LLW) and sources (government, commercial fuel cycle, and I/I) are included. DOE

N83-17421# Los Alamos Scientific Lab., N. Mex.
DATA-ACQUISITION SYSTEM FOR A TIME-PROJECTION CHAMBER
J. W. Lillberg 1981 4 p refs Presented at the IEEE Symp. on Nucl. Sci., San Francisco, 21 Oct. 1981
(Contract W-7405-eng-36)
(DE82-002334; LA-UR-81-3185; CONF-811012-16) Avail: NTIS HC A02/MF A01

A data acquisition system was designed to digitize the trajectory information of muon decay every eight milliseconds. A time projection chamber is used which operates in a solenoidal magnetic field. It has 315 sense wires which induce signals on 5355 pads and thus create approximately 402,000 bits of data for each event or 55 megabits per second. Most of the data are zeros which are handled using a hardware-aided compaction scheme. The meaningful data are extracted by a modular system consisting of three basic building blocks: flash encoders with associated storage, wire hit memory boards, and bit-slice data preprocessors, which are described. DOE

N83-17422# Los Alamos Scientific Lab., N. Mex.
NETWORK FILE-STORAGE SYSTEM
William W. Collins, Marjorie J. Devaney, and Emily W. Willbanks 1982 5 p Presented at the COMPCON Meeting, San Francisco, Feb. 1982
(Contract W-7405-eng-36)
(DE82-006108; LA-UR-81-3558; CONF-820204-1) Avail: NTIS HC A02/MF A01

The Common File System (CFS) is a file management and mass storage system for the Los Alamos National Laboratory's computer network. The CFS is organized as a hierarchical storage system: active files are stored on fast access storage devices, larger, less active files are stored on slower, less expensive devices, and archival files are stored offline. Files are automatically moved between the various classes of storage by a file migration program that analyzes file activity, file size and storage device capabilities. This has resulted in a cost effective system that provides both fast access and large data storage capability (over five trillion bits currently stored). DOE

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N83-17423*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPUTER PROGRAM FOR STIRLING ENGINE PERFORMANCE CALCULATIONS Final Report
Roy C. Tew, Jr. Jan. 1983 100 p refs
(Contract DE-AI01-77CS-51040)
(NASA-TM-82960; DOE/NASA/51040-42; E-1377; NAS 1.15:82960) Avail: NTIS HC A05/MF A01 CSCL 10B

The thermodynamic characteristics of the Stirling engine were analyzed and modeled on a computer to support its development as a possible alternative to the automobile spark ignition engine. The computer model is documented. The documentation includes a user's manual, symbols list, a test case, comparison of model predictions with test results, and a description of the analytical equations used in the model. S.L.

N83-17424*# Garrett Turbine Engine Co., Phoenix, Ariz. Engineering Staff.
ADVANCED GAS TURBINE (AGT) POWERTRAIN SYSTEM DEVELOPMENT FOR AUTOMOTIVE APPLICATIONS Semiannual Progress Report, Jul. - Dec. 1981
Jul. 1982 79 p refs Sponsored in part by DOE
(Contract DEN3-167)
(NASA-CR-167983; DOE/NASA/0167-82/4; NAS 1.26:167983; Garrett-31-3725(4); SAPR-4) Avail: NTIS HC A05/MF A01 CSCL 13F

A gas turbine powertrain for automobiles with reduced fuel consumption and reduced environmental impact is investigated. The automotive gas turbine, when installed in an automobile (3000 pounds inertia weight), provides a CFDC fuel economy of 42.8 miles per gallon based on EPA test procedures and diesel No. 2 fuel. The AGT powered vehicle substantially gives the same

overall vehicle driveability and performance as a comparable production vehicle powered by a conventional spark ignition powertrain system. The emissions are less than federal standards, and a variety of fuels can be used. S.L.

N83-17425# Sandia Labs., Albuquerque, N. Mex.
TRUCK AND RAIL SHOCK AND VIBRATION ENVIRONMENTS DURING NORMAL TRANSPORT
G. H. Lamoreaux, A. A. Trujillo, and C. F. Magnuson 1981 15 p refs Presented at the Conf. on Designing for Damage Prevention in the Transportaion Environ., Gathersburg, Md., 21 Oct. 1981
(Contract DE-AC04-76DP-00789)
(DE82-001906; SAND-81-1290C; CONF-811074-2) Avail: NTIS HC A02/MF A01

To provide technical management and support for programs which span a broad range of technical problems related to the transport of nuclear materials, data were obtained on the shock and vibration experienced by large shipping casks during normal transport. The data were obtained by: (1) extracting, reviewing, and reducing the shock and vibration environment definitions on file in the DOE/DOD and DOE transportation data banks; (2) determining the best estimates of the environments for large shipping containers on trucks and railroad cars; (3) defining and conducting tests to obtain any additional data required; and (4) conducting dynamic analyses of the shock environment experienced by cargo during rail switching and coupling to identify the dependence of the shock environment on heavy cargo weights and on shock attenuation couplers. DOE

N83-17426# Vought Corp., Dallas, Tex.
COLD WEATHER TRANSIT TECHNOLOGY PROGRAM. VOLUME 8: DEVELOPMENT OF TRANSITWAY COUNTERMEASURES FOR COMBATTING ICE AND SNOW PROBLEMS Final Report
W. C. Albach et al Washington Urban Mass Transportation Administration Apr. 1982 156 p refs Sponsored in part by Notre Dame Univ.
(PB82-256496; UMTA-IN-06-0009-82-8) Avail: NTIS HC A08/MF A01 CSCL 13F

The objective of the transitway countermeasures task was to develop and evaluate energy efficient, practical methods of combatting the effects of snow and ice on vehicle operation. Transitway investigations in this program included: traction improvements, power and signal collection improvements, guideway switch improvements, and guideway design. The full-scale AGT vehicle component and subsystem testing was satisfactorily completed. GRA

N83-17427# Vought Corp., Dallas, Tex.
COLD WEATHER TRANSIT TECHNOLOGY PROGRAM. VOLUME 9: DEVELOPMENT OF VEHICLE COUNTERMEASURES FOR COMBATTING ICE AND SNOW PROBLEMS Final Report, 1 Jan. 1980 - 30 Sep. 1981
W. C. Albach, H. P. Barrilleaux, R. S. Jacobsen, B. L. Koonce, A. R. Larson, Jr., J. N. Payne, O. H. Preston, III, D. G. Randolph, Jr., G. P. Schell, and W. A. Scott Washington Urban Mass Transportation Administration Sep. 1981 170 p Sponsored in part by Notre Dame Univ.
(Grant DOT-UMTA-IN-06-0009)
(PB82-257387; UMTA-IN-06-0009-82-9) Avail: NTIS HC A08/MF A01 CSCL 13F

Vehicle countermeasures for combatting ice and snow problems are described. More effective methods for assuring the dependable operation of urban mass transit systems in severe winter weather conditions were developed. The findings of this program are intended to assist administrators, designers, planners, operators, suppliers, and others involved in the design, implementation, and operation of mass transit systems which operate in cold weather environments. Energy efficient, practical methods of combatting the effects of snow and ice on vehicle operation were evaluated. The vehicle used was the prototype vehicle P40. The vehicle subsystems and components of the P40 which had previously been identified as susceptible to ice and snow problems are discussed. GRA

N83-17428# Trans Systems Corp., Vienna, Va.
ASSESSMENT OF BATTERY BUSES AND BATTERY TECHNOLOGY Final Report, Aug. 1981 - May 1982
J. C. H. Woo, E. J. Longstreet, and W. Raithel Washington Urban Mass Transportation Administration May 1982 93 p refs
(Grant DOT-UMTA-VA-06-0087)
(PB82-260019; TS-123; UMTA-VA-06-0087-82-1) Avail: NTIS HC A05/MF A01 CSCL 13F

Public concern with the deterioration of the quality of the environment caused by air, water, and noise pollution, became a major public issue during the 1960s resulting in the passage of new legislation and institutional changes in the United States. This concern was not limited to the United States, but also made itself felt with similar intensity in most of the other industrialized nations. One consequence was a renewed interest in the use of electric power for propulsion with reduced pollutant emissions and noise levels as a substitute for the internal combustion engine. Because of its effect on the urban environment and its visibility, the transit bus became a prime target for conversion to electric propulsion, particularly through the use of the electric storage battery. In general, electric power is now an attractive alternative to the use of petroleum-based fuels in urban transportation. GRA

N83-17429# Vought Corp., Dallas, Tex.
COLD WEATHER TRANSIT TECHNOLOGY PROGRAM. VOLUME 7: LIGHTWEIGHT TRANSIT VEHICLE TRACTION PERFORMANCE ON ICE AND SNOW Final Report, 1 Jan. 1980 - 30 Jun. 1981
W. C. Albach, V. W. Hall, D. G. Randolph, Jr., and G. P. Schell Washington Urban Mass Transportation Administration Apr. 1982 66 p Sponsored in part by Notre Dame Univ.
(Grant DOT-UMTA-IN-06-0009)
(PB82-256488; UMTA-IN-06-0009-82-7) Avail: NTIS HC A04/MF A01 CSCL 13F

Traction tests of a lightweight transit test vehicle are described. More effective methods for assuring the dependable operation of urban mass transit systems in severe winter weather conditions are developed. The findings of this program are intended to assist administrators, designers, planners, operators, suppliers, and others involved in the design, implementation, and operation of mass transit systems which operate in cold weather environments. The performance of a half scale, lightweight vehicle operated over a range of ice and snow conditions on rubber tires and steel wheels is documented. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N83-17430*# Computer Sciences Corp., Silver Spring, Md.
SKYMAP SYSTEM DESCRIPTION: STAR CATALOG DATA BASE GENERATION AND UTILIZATION
D. M. Gottlieb Jun. 1979 663 p refs Revised
(Contract NAS5-24300)
(NASA-CR-170463; NAS 1.26:170463; CSC/SD-76/6041UD2-Rev) Avail: NTIS HC A99/MF A01 CSCL 03A

The specifications, design, software description, and use of

the SKYMAP star catalog system are detailed. The SKYMAP system was developed to provide an accurate and complete catalog of all stars with blue or visual magnitudes brighter than 9.0 for use by attitude determination programs. Because of the large number of stars which are brighter than 9.0 magnitude, efficient techniques of manipulating and accessing the data were required. These techniques of staged distillation of data from a Master Catalog to a Core Catalog, and direct access of overlapping zone catalogs, form the basis of the SKYMAP system. The collection and tranformation of data required to produce the Master Catalog data base is described. The data flow through the main programs and levels of star catalogs is detailed. The mathematical and logical techniques for each program and the format of all catalogs are documented. Author

N83-17431*# California Univ., Berkeley. Space Sciences Lab.
LONG TERM X-RAY OBSERVATIONS OF SYSTEMS WITH UNUSUAL OPTICAL COUNTERPARTS AND MODULATION MEASUREMENT OF SELECTED ASTRONOMICAL SOURCES Final Technical Report
C. Stuart Bowyer 19 Nov. 1982 3 p refs
(Grant NAG5-117)
(NASA-CR-170479; NAS 1.26:170479) Avail: NTIS HC A02/MF A01 CSCL 03A

The OAO-3 satellite was used for several months' observation of the loss mass X-ray binary sources 2A18822-371 and 4U2129+47 in a search for variability similar to the 35 day on-off cycle observed in Her X-1. The related system Cyg X-2 was observed both optically and in X-rays covering one complete binary cycle of 9.8 days. The UCL X-ray telescope observations revealed no periodities nor obvious variability other than the known orbital periods; however, the ground-based optical spectroscopy supports the interpretation of the photometry periodicities as representing orbital motion in 2A1822-371 and detected radial velocity motions on the photometric period in 4U2129+47. The shape and the length of the 4.8 hour periodicity in the X-ray emission from Cyg X-3 was also studied. The quality OAO-3 data obtained to measure the light curve and look for a change in the period and/or obtain improved measurement of the slope of the light curve was insufficient. A.R.H.

N83-17432# California Univ., Los Angeles.
DIGITAL DISPLAY OF ASTRONOMICAL DATA Final Report, 1 Sep. 1981 - 30 Sep. 1982
Steven A. Grandi Hanscom AFB, Mass. AFGL Aug. 1982 15 p
(Contract F19628-81-K-0041; AF Proj. 2311)
(AD-A120382; AFGL-TR-82-0211) Avail: NTIS HC A02/MF A01 CSCL 03/1

A brief summary is given of techniques to enhance for photographic display digital astronomical images. The phenomenon of photographic deresolution is discussed and a proposed algorithm, the highpass squared filter, is presented to correct for this effect. Author (GRA)

N83-17433# Los Alamos Scientific Lab., N. Mex.
AUTOMATED SUPERNOVA SEARCH
Stirling A. Colgate Oct. 1981 6 p refs Presented at the Advan. Study Inst. on Supernovae, Cambridge, England, 29 Jun. - 10 Jul. 1981 Submitted for publication
(Contract W-7405-eng-36)
(DE82-002399; LA-UR-81-2969; CONF-8106163-4) Avail: NTIS HC A02/MF A01

A program is described of an automated supernovae search based upon complete remote computer control of a telescope and vidicon digital imaging system. DOE

N83-17378*# Alabama Univ., University. Dept. of Physics and Astronomy.
HYDRODYNAMIC STABILITY OF JETS PRODUCED BY MASS ACCRETING SYSTEMS
Philip E. Hardee *In* NASA. Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac. Fellowship Program Aug. 1982 12 p refs (For primary document see N83-17359 07-80)
Avail: NTIS HC A99/MF A01 CSCL 03A

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N83-17434*# National Aeronautics and Space Administration, Washington, D. C.
LONG PERIODIC TERMS IN THE SOLAR SYSTEM
P. Bretagnon Jun. 1982 26 p refs Transl. into ENGLISH from Astron. et Astrophys. (France), v. 30, no. 1, Jan. 1974 p 141-154 Previously announced as A74-21142 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Bureau des Longitudes Observatoire, Paris
(Contract NASw-3541)
(NASA-TM-76994; NAS 1.15:76994) Avail: NTIS HC A03/MF A01 CSCL 03B

The long period variations of the first eight planets in the solar system are studied. First, the Lagrangian solution is calculated and then the long period terms with fourth order eccentricities and inclinations are introduced into the perturbation function. A second approximation was made taking into account the short period terms' contribution, namely the perturbations of first order with respect to the masses. Special attention was paid to the determination of the integration constants. The relative importance of the different contributions is shown. It is useless, for example, to introduce the long period terms of fifth order if no account has been taken of the short period terms. Meanwhile, the terms that have been neglected would not introduce large changes in the integration constants. Even so, the calculation should be repeated with higher order short period terms and fifth order long periods. Author

N83-17435*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TYPE 2 RADIO BURSTS, INTERPLANETARY SHOCKS AND ENERGETIC PARTICLE EVENTS
H. V. Cane and R. G. Stone Nov. 1982 30 p refs Submitted for publication
(NASA-TM-84941; NAS 1.15:84941) Avail: NTIS HC A03/MF A01 CSCL 03B

Using the ISEE-3 radio astronomy experiment data 37 interplanetary (IP) type II bursts have been identified in the period September 1978 to December 1981. These events and the associated phenomena are listed. The events are preceded by intense, soft X ray events with long decay times (LDEs) and type II and/or type IV bursts at meter wavelengths. The meter wavelength type II bursts are usually intense and exhibit herringbone structure. The extension of the herringbone structure into the kilometer wavelength range results in the occurrence of a shock accelerated (SA) event. The majority of the interplanetary type II bursts are associated with energetic particle events. These results support other studies which indicate that energetic solar particles detected at 1 A.U. are generated by shock acceleration. From a preliminary analysis of the available data there appears to be a high correlation with white light coronal transients. B.W.

N83-17436# Rockefeller Univ., New York.
COSMOLOGICAL TERM AND SUPERSYMMETRY
Heinz Pagels 1981 10 p refs Presented at Orbis Scientiae Conf., Fort Lauderdale, Fla., 19 Jan. 1981
(Contract DE-AC02-81ER-40333)
(DE82-007560; DOE/EV-40033/1; CONF-810134-3) Avail: NTIS HC A02/MF A01

A persistent problem in quantum field theory is the existence of vacuum energy which is defined by the expectation value of theta/sub microvolts/ = 1/sq f/g mu where theta/sub microvolts/ is the stress energy tensor and F is a constant. For all field theories with the exception of gravity the value of F is of no

importance - it corresponds to a uniform background vacuum energy density throughout space. Since all energy levels are measured relative to the vacuum energy this quantity is unobservable. However, the Einstein equations for the gravity field know about energy in the vacuum and for 0.1F approximately (sqGe V), corresponding to typical value from hadron physics, they imply that the universe curls up into a little ball about 100 meters in diameter, contrary to experience. This is the vacuum energy problem. DOE

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N83-17437*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE VOYAGER FLIGHTS TO JUPITER AND SATURN
Jul. 1982 63 p Original contains color illustrations
(NASA-EP-191; JPL-400-148; NAS 1.19:191) Avail: NTIS HC A04/MF A01 CSCL 03B

The results of the mini-Grand Tour to Jupiter and Saturn by the Voyager 1 and 2 spacecraft are highlighted. Features of the spacecraft are depicted including the 11 instruments designed to probe the planets and their magnetic environments, the rings of Saturn, the fleets of satellites escorting the planets, and the interplanetary medium. Major scientific discoveries relating to these phenomena are summarized. J.M.S.

N83-16364# Joint Publications Research Service, Arlington, Va.
SURFACE OF VENUS
L. V. Ksanfomaliti *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 59-64 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 1, Jan. - Feb. 1982 p 16-19 (For primary document see N83-16360 07-12)
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N83-16365# Joint Publications Research Service, Arlington, Va.
SIGMA-2 CHROMATOGRAPH DATA ON VENUS'S ATMOSPHERE
L. Mukhin and V. Gelman *In its* USSR Rept.: Space, No. 18 (JPRS-82169) 4 Nov. 1982 p 65-67 Transl. into ENGLISH from Pravda (Moscow), 4 Jun. 1982 p 2 (For primary document see N83-16360 07-12)
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92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N83-17438# Pennsylvania State Univ., University Park. Dept. of Astronomy.
STELLAR ANALOGS OF SOLAR ACTIVITY Final Report, 15 Dec. 1979 - 15 Dec. 1981
Lawrence W. Ramsey Hanscom AFB, Mass. AFGL 1 Jun. 1982 33 p refs
(Contract F19628-80-C-0036; AF Proj. 2311)
(AD-A120476; AFGL-TR-82-0170) Avail: NTIS HC A03/MF A01 CSCL 03/2

A fiber-coupled spectrograph (FSC) for moderate-resolution stellar observations has been designed, fabricated, and tested. The excellent shortand long-term stability of this instrument represents a significant advance in the state-of-the-art for high precision stellar spectrophotometry. A preliminary observational survey of the greatly enhanced analogs of solar activity that exist in flare stars and the RS CVn binaries has been performed using this instrument, and the starspot model for explaining the photometric variability of these latter stars has been verified spectroscopically. Author (GRA)

N83-17439*# Stanford Univ., Calif. Inst. for Plasma Research.
INVALIDITY OF LOCAL THERMODYNAMIC EQUILIBRIUM FOR ELECTRONS IN THE SOLAR TRANSITION REGION. 1: FOKKER-PLANCK RESULTS
Edward C. Shoub Aug. 1982 94 p refs
(Grants NAGw-92; NGL-05-020-272; Contract N00014-75-C-0673)
(NASA-CR-169647; NAS 1.26:169647; AD-A120515; SU-SUIPR-930) Avail: NTIS HC A05/MF A01 CSCL 03B

An effective numerical method for solving boundary value problems for the Landau Fokker-Planck equation is developed and applied to calculating the electron velocity distribution function in model solar transition regions. Numerical results illustrating the speed, pitch angle and spatial dependence of the distribution function are presented. From these it is concluded that the widely-invoked assumption that in weakly inhomogeneous collisional plasma the angle-averaged distribution function remains close to local-Maxwellian distribution is incorrect. Instead, the distribution function forms an anisotropic, high velocity tail in the lower temperature regions due to the diffusion of fast electrons anti-parallel to the temperature gradient. It is shown that as a result of there being an excess of fast electrons in the low transition region (T < or about 3 x 10 to the 5th power K, say), inelastic electron-ion collision rates are significantly enhanced over the Maxwellian values. Attendant effects on the ionization balance of a typical metal (magnesium) are shown to be significant. Implications of the breakdown of the loca-Maxwellian approximation for several outstanding questions related to the solar transition region are discussed, including: energy balance in low transition region and upper chromosphere, the helium resonance line spectrum, the Schmahl-Orrall observation of continuum absorption by neutral hydrogen, and the origin of the 20,000 K temperature plateau. GRA

N83-17440# National Center for Atmospheric Research, Boulder, Colo.
AN ATLAS OF VARIATIONS IN THE SOLAR CONSTANT CAUSED BY SUNSPOT BLOCKING AND FACULAR EMISSIONS FROM 1874 TO 1981
Douglas V. Hoyt and John A. Eddy May 1982 114 p refs
(Grant NSF ATM-77-23757)
(PB82-258575; NCAR/TN-194) Avail: NTIS HC A06/MF A01 CSCL 03B

A reconstruction of the solar constant variations on a day by day basis for slightly more than a century (1874 to 1981) is presented. The atlas reconstructs only the short-term variations in S that have now been demonstrated from satellite observations to follow from day-to-day changes in surface solar activity. Although the reconstuction is based on the physically-improbable approximation of an infinite storage time within the Sun, i.e., that the solar radiant flux blocked by sunspots is never released, the best observations now available fit this assumption rather well, suggesting that the storage time within the Sun must be of the time scale of months or more. GRA

N83-17441# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo. Environmental Data and Information Service.
SOLAR-GEOPHYSICAL DATA COMPREHENSIVE REPORTS. PART 2: DATA FOR SEPTEMBER 1981, APRIL 1980 AND MISCELLANEA. EXPLANATION OF DATA REPORTS ISSUED AS NUMBER 450 (SUPPLEMENT) FEBRUARY 1982
Helen E. Coffey Mar. 1982 98 p
(PB82-258872; SGD-451-Pt-2; NOAA-82060302-Pt-2) Avail: NTIS HC A05/MF A01 CSCL 03B

In addition to an index for 1981-1982, this issue of comprehensive reports provides data for September 1981 on solar radio emission, solar X-ray radiation and mass ejections from the Sun. Solar flares for April 1980 are given. Miscellaneous data includes

active regions 22 July - 18 August 1981 and synoptic solar maps 22 July - 18 August 1981. GRA

N83-17442*# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA PROMPT REPORTS. PART 1: DATA FOR APRIL 1982, MARCH 1982 AND LATE DATA. EXPLANATION OF DATA REPORTS ISSUED AS NUMBER 450 (SUPPLEMENT) FEBRUARY 1982
Helen E. Coffey May 1982 155 p 2 Vol.
(PB82-262684; SGD-453-Pt-1; NOAA-82071907-Pt-1) Avail: NTIS HC A08/MF A01 CSCL 03B

In addition to an index for 1981-1982, this prompt report provides data for April 1982 on: alert periods, daily solar indices, solar flares, solar radio emission, inferred interplanetary magnetic field polarities, mean solar magnetic field, spacecraft observations, and Boulder Geomagnetic Substorm Log. It also provides data for March 1982 on: daily solar activity centers, sudden ionospheric disturbances, solar radio emission, cosmic rays, and geomagnetic indices. Late data includes geomagnetic indices for February 1982. GRA

N83-17443# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA COMPREHENVISVE REPORTS, NUMBER 453. PART 2: DATA FOR NOVEMBER 1981 AND MISCELLANEA. EXPLANATION OF DATA REPORTS ISSUED AS NUMBER 450 (SUPPLEMENT) FEBRUARY 1982
Helen E. Coffey, ed. May 1982 68 p 2 Vol.
(PB82-262692; SGD-453-Pt-2; NOAA-82071908-Pt-2) Avail: NTIS HC A04/MF A01 CSCL 03B

In addition to an index for 1981-1982, this issue of comprehensive reports provides data for November 1981 on: solar radio emission, solar X-ray radiation, and mass ejections from the Sun. GRA

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N83-17444*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MEASUREMENTS OF GALACTIC PLANE GAMMA RAY EMISSION IN THE ENERGY RANGE FROM 10 - 80 MeV
D. L. Bertsch and D. A. Kniffen Dec. 1982 35 p refs Submitted for publication
(NASA-TM-84960; NAS 1.15:84960) Avail: NTIS HC A03/MF A01 CSCL 03B

A spark chamber gamma ray telescope was developed and flown to observe diffuse gamma ray emission from the central region of the galaxy. The extension of observations down to 10 MeV provides important new data indicating that the galactic diffuse gamma ray spectrum continues as a power law down to about 10 MeV, an observation in good agreement with recent theoretical predictions. Data from other experiments in the range from 100 keV to 10 MeV show a significant departure from the extension of the power-law fit to the medium energy observations reported here, possibly indicating that a different mechanism may be responsible for the emissions below and above a few MeV. The intensity of the spectrum above 10 MeV implies a galactic electron spectrum which is also very intense down to about 10 MeV. Electrons in this energy range cannot be observed in the solar cavity because of solar modulation effects. The galactic gamma ray data are compared with recent theoretical predictions. Author

N83-17445# Stanford Univ., Calif. Inst. for Plasma Research.
DETECTION OF SOLAR FIVE MINUTE OSCILLATIONS OF LOW DEGREE
Philip H. Scherrer, John M. Wilcox, Jorgen Christensen-Dalsgaard (National Center for Atmospheric Research), and Douglas O. Gough (Inst. of Astronomy, Cambridge, England) Apr. 1982 40 p refs Submitted for publication
(Contract N00014-76-C-0207)
(AD-A119353; SU-IPR-923) Avail: NTIS HC A03/MF A01 CSCL 03/2

Solar five-minute oscillations of degree small = 3, 4 and 5 have been observed at the Stanford Solar Observatory, in the Doppler shift of the Fe5124 line. The frequencies and amplitudes are in broad agreement with previous observations of modes with small less than or 3, though we note that there are some systematic discrepancies between the results of different observers. Author (GRA)

99 GENERAL

N83-17446*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RESEARCH AND TECHNOLOGY: FISCAL YEAR 1982 REPORT
Annual Report
1982 97 p refs
(NASA-TM-85196; NAS 1.15:85196) Avail: NTIS HC A05/MF A01 CSCL 05B

Accomplishments and research objectives are described in the following areas: (1) space sciences; (2) space and terrestrial applications; (3) flight projects and mission definition studies; (4) space tracking and data systems; and (5) space technology. Data analysis efforts, instrument development, and measurement projects are among the aspects considered. A.R.H.

N83-17447# European Space Agency, Paris (France). Scientific and Technical Publications Branch.
CATALOGUE OF ESA PUBLICATIONS IN 1979
Mar. 1980 22 p refs
(ESA-SP-1025) Avail: NTIS HC A02/MF A01

The ESA bulletins, journals, special publications, scientific and technical reports, brochures, contractor reports, and procedures, standards and specifications published in 1979 are listed. Over 200 titles are given. Author (ESA)

N83-17448# European Space Agency, Paris (France). Scientific and Technical Publications Branch.
CATALOGUE OF ESA PUBLICATIONS IN 1981
B. Battrick, comp. May 1982 33 p refs
(ESA-SP-1044) Avail: NTIS HC A03/MF A01

The ESA bulletins, journals, special publications, scientific and technical reports, brochures, contractor reports, and procedures, standards and specifications published in 1981 are listed. Over 150 titles are given. Author (ESA)

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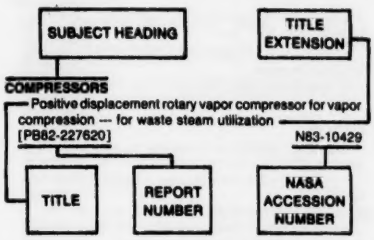
Typical Subject Index Listing



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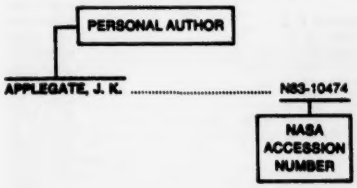

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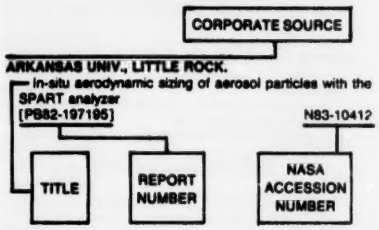

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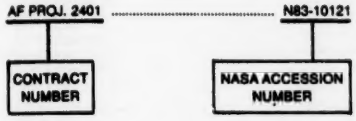

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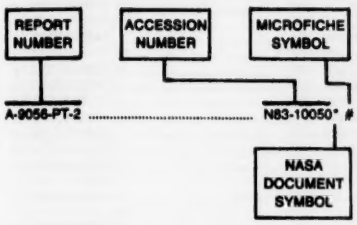

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